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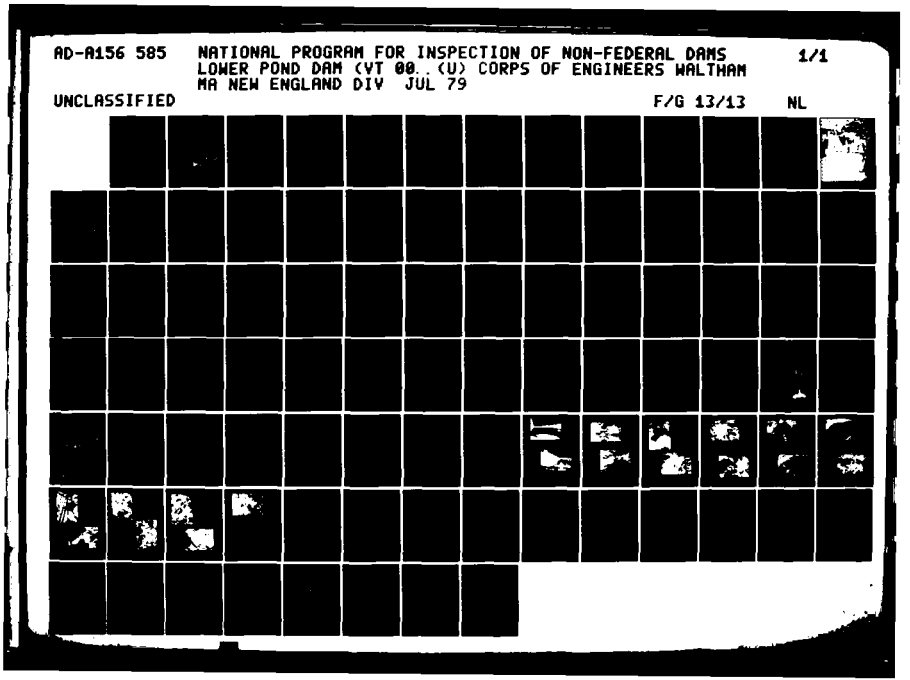

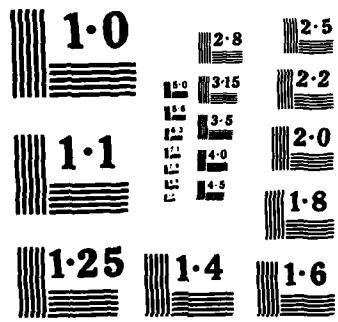

RICHELIEU RIVER BASIN

HINESBURG, VERMON

LOWER POND DAM

VT 00059

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JULY 1979

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Richelieu River Basin
Hinesburg, VT.
Patrick Brook

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

THe dam is a dry masonry structure with an earthen embankment on the upstream side side of the wall. It is about 230 ft. long with a maximum height of 12 ft. The dam is in fair condition. It is small in size with a significant hazard potential. The test flood for the dam is ½ the PMF. Several areas of seepage at the base of the downstream slope of the dam were noted. There are various recommendations which must be implemendted by the owner.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED

OCT 29 1979

Honorable Richard A. Snelling
Governor of the State of Vermont
State Capitol
Montpelier, Vermont 05602

Dear Governor Snelling:

Inclosed is a copy of the Lower Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Water Resources, the cooperating agency for the State of Vermont. In addition, a copy of the report has also been furnished the owner, Lake Iroquois Manufacturing Co., Hinesburg, Vermont 05469.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Water Resources for your cooperation in carrying out this program.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

LOWER POND DAM

VT 00059

CONNECTICUT RIVER BASIN
HINESBURG, VERMONT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I - INSPECTION REPORT
BRIEF ASSESSMENT

Identification No.:	00059
Name of Dam:	Lower Pond Dam
Town:	Hinesburg
County and State:	Chittenden, Vermont
Stream:	Patrick Brook
Date of Inspection:	June 21, 1979

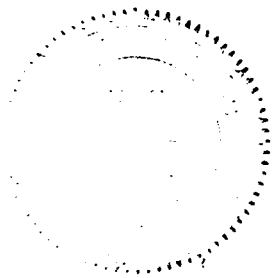
Lower Pond Dam is a dry masonry structure with an earthen embankment on the upstream side of the wall. The overall length of the dam is about 230 feet and the maximum height is about 12 feet. Top width of the dam is 10 feet. A concrete slab spillway section is located near the center of the dam with 2 foot high training walls. A gated 24 inch outlet pipe is located to the left and below the spillway. The dam was constructed in 1867. No drawings, design calculations, or construction data were available.

Visual inspection indicated that the dam is in fair condition. The inspection revealed local sloughing along the upstream face of the dam, cracking of the concrete spillway slab and several areas of seepage at the base of the downstream slope of the dam.

Based on the small size of the dam and its significant hazard classification and in accordance with Corps of Engineers Guidelines, the test flood inflow should be of a magnitude ranging from the 100 year frequency flood to ½ the Probable Maximum Flood (PMF). One half the PMF was used for the test flood inflow, which is 3900 cfs. The routed test flood outflow of 3,680 cfs overtops the dam by approximately 3.4 feet. With the water surface at the top of dam the spillway capacity is approximately 160 cfs (about 4 percent of the routed test flood outflow).

It is recommended that the owner engage a qualified registered professional engineer to do the following (1) design adequate upstream slope protection (2) investigate seepage at the downstream base of the dam and (3) investigate spillway adequacy and design any modifications if necessary. Remedial measures include the preparation of a downstream warning system in the event of emergency and removal of vegetation from downstream of the dam.

The recommendations and remedial measures are described in Section 7 and should be addressed within one year after receipt of this Phase I Inspection Report by the owner.



HOWARD, NEEDLES, TAMMEN & BERGENDOFF
Boston, Massachusetts

Gordon H. Slaney, Jr.
Project Engineer

This Phase I Inspection Report on Lower Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

JOSEPH W. FENEGAN, JR., MEMBER
Water Control Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

JOSEPH A. MCELROY, CHAIRMAN
Chief, NED Materials Testing Lab.
Foundations & Materials Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there by any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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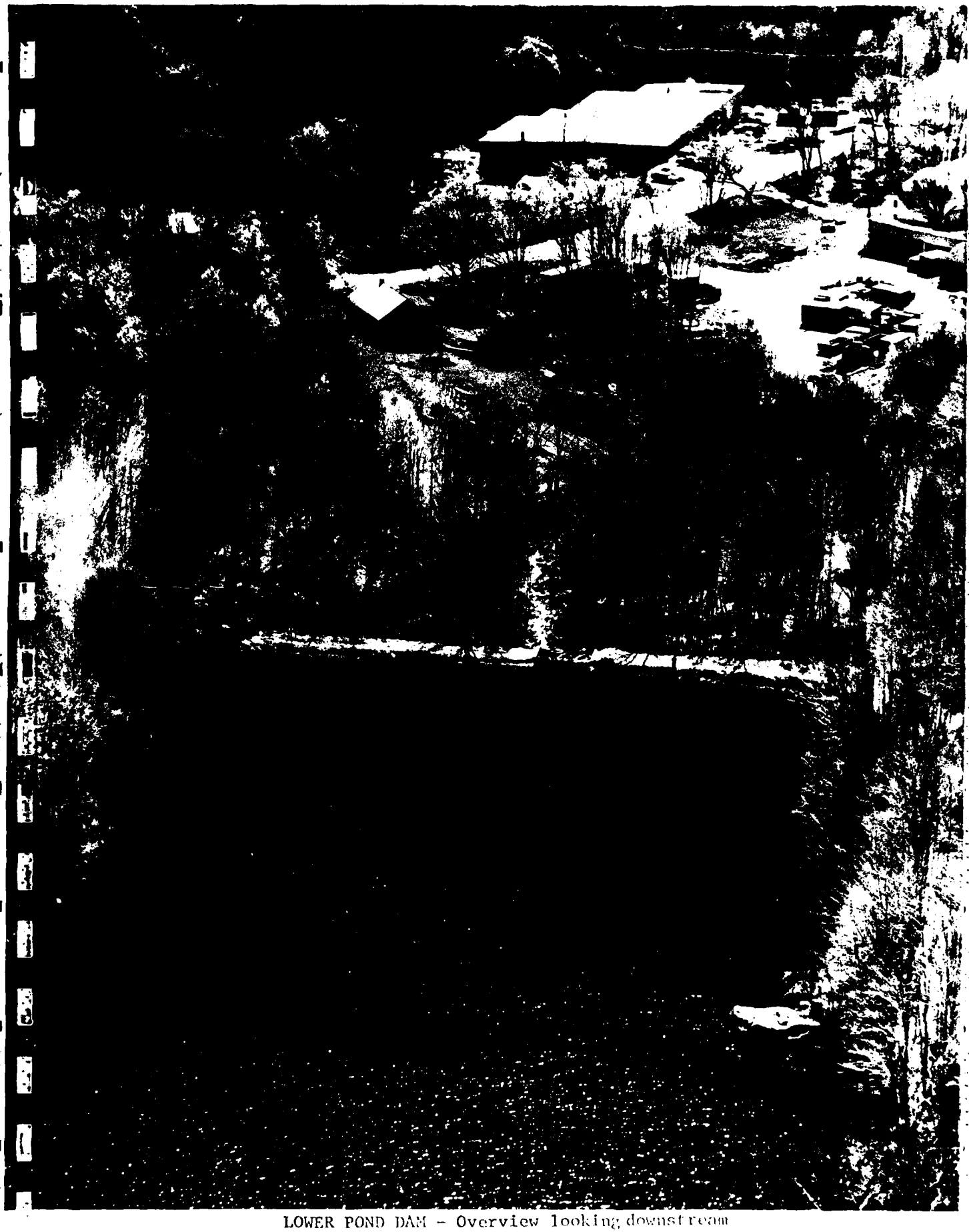
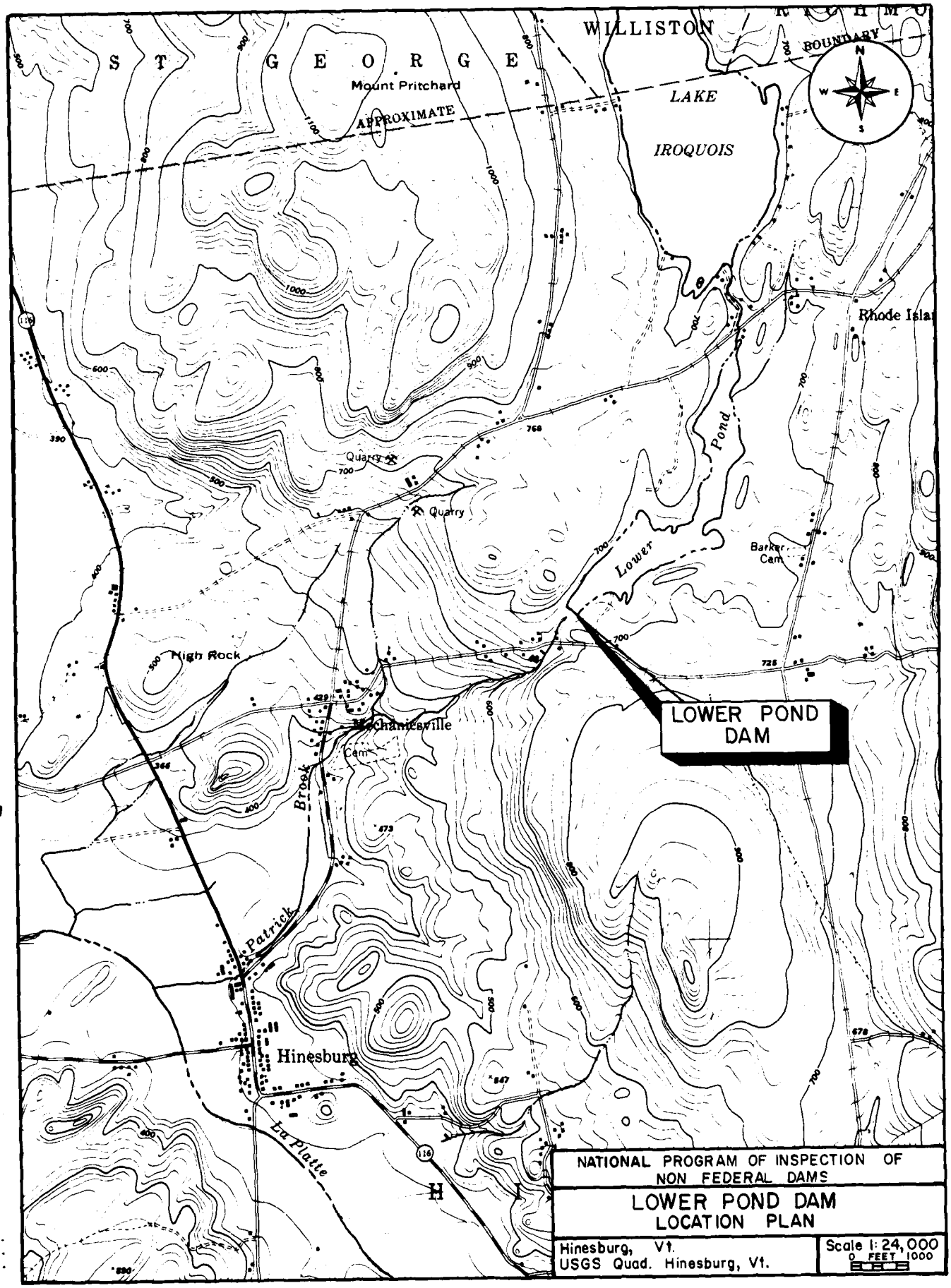
APPENDIXES



LOWER POND DAM - Overview looking downstream


WILLISTON
ST GEORGE
BOUNDARY
Mount Pritchard
APPROXIMATE
LAKE
IROQUOIS
Rhode Isla
Quarry
Quarry
Pond
Lower
Barker Cem
High Rock
LOWER POND DAM
Cem
Brook
Patrick
Hinesburg
La Platte
NATIONAL PROGRAM OF INSPECTION OF NON FEDERAL DAMS
LOWER POND DAM
LOCATION PLAN
Hinesburg, Vt.
USGS Quad. Hinesburg, Vt.
Scale 1:24,000
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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
LOWER POND DAM

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Howard, Needles, Tammen & Bergendoff has been retained by the New England Division to inspect and report on selected dams in the State of Vermont. Authorization and notice to proceed were issued to Howard, Needles, Tammen & Bergendoff under a letter of March 30, 1979 from John P. Chandler, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0060 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) To encourage and prepare the states to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. Lower Pond Dam is located on Patrick Brook (Richelieu River Basin) approximately 1.6 miles upstream of Route 116 in the Town of Hinesburg, Vermont. The dam is shown on U.S.G.S. Quadrangle Hinesburg, Vermont, with approximate coordinates N44°25'54" E73°5'30", Chittenden County, Vermont. The location of Lower Pond Dam is shown on the preceeding page.

b. Description of Dam and Appurtenances. Lower Pond Dam is a dry masonry structure with an earth embankment on the upstream side. Overall length of the dam is approximately 230 feet. Maximum height of the dam is about 12 feet. At the top of the dam the dry masonry is 10 feet wide. The crest of the dam is on two levels each 5 feet wide, with a two foot difference in height. The higher crest is on the upstream side of the dam. Slope of the earth embankment is unknown. The downstream side of the stone masonry is vertical.

Located at the approximate center of the dam is a concrete slab spillway section, with an 18 foot crest length and training walls about 2 feet high. A 24 inch diameter outlet pipe is located below the left side of the spillway, at an approxime invert of 251.0. An unusual control system for the outlet pipe consists of a long wooden lever supported by steel channels which activates a butterfly valve located inside the pipe.

Figure 1 located in Appendix B, show a plan of the dam and its appurtenant structures. Photographs of each structure are shown in Appendix C.

c. Size Classification. Small (hydraulic height-12 feet, storage-246 acre-ft) classification based on the hydraulic height being less than 40 feet and the storage being less than 1000 acre-feet as given in Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. The potential for damage posed by this dam is classified as significant. Failure of the dam with the water level at the top of dam would result in a flood wave about 7 feet high in the reach extending from the dam to Mechanicsville about 1 mile downstream. Two hundred feet downstream of the dam there is one dwelling set about 4 feet above the channel. The Iroquois Manufacturing Company 1000 feet downstream has its first floor working area about 3 feet above the crest of a small spillway adjacent to the plant.

e. Ownership. This dam is owned by the Iroquois Manufacturing Company of Hinesburg, Vermont.

f. Operator. This dam is operated by the Lake Iroquois Manufacturing Company, Hinesburg, Vermont, 05469. Mr. Leland Lyman owner, Telephone No. 802/482-2155.

g. Purpose of Dam. The water impounded by this reservoir is used as a cooling water supply for the Iroquois Manufacturing Company.

h. Design and Construction History. The present Lower Pond Dam was built about 1867. Prior to that time there was a small sawmill dam at that location dating back to about 1822. In 1968 the front of the dam was refaced. In 1978 an erosion cavity at the entrance to the spillway was repaired and fill was added to the upstream face of the dam.

i. Normal Operating Procedures. The gate on the 24 inch outlet pipe is only operated to discharge water to a small pond adjacent to the Iroquois Manufacturing Company when the normal flow does not provide enough cooling water.

1.3 Pertinent Data

a. Drainage Area. The area tributary to Lower Pond Dam consists of 5.26 square miles of rolling wooded terrain. Seventy one percent of the watershed is tributary to Lake Iroquois which is located 1.2 miles upstream of the dam. There are no major streams in the basin other than the connection between Lake Iroquois and Lower Pond (Sunset Lake). Maximum elevation in the basin is about 1,540 feet MSL and the normal reservoir elevation is at elevation 661.

The area around the reservoir is heavilly wooded. There are about 6 houses along the shoreline all set well above the water level. The reservoir banks are clean except for some weed growth at the upstream face of the dam.

b. Discharge at Dam Site

(1) The outlet works for Lower Pond Dam consists of a 24 inch diameter steel pipe with an approximate invert of 651.0. Discharge is controlled by a butterfly type gate. Maximum discharge through the outlet pipe with the water surface at the spillway crest is about 40 cfs.

(2) There are no records of maximum discharge at the site. However, it was reported that the water surface once reached the top of dam, which would correspond to a discharge of about 160 cfs.

(3) The spillway capacity with the water surface the top of dam, elevation 663.0, would be about 160 cfs.

(4) The spillway capacity with the water surface at the test flood elevation of 666.4 would be about 690 cfs.

(5) The total project discharge at the test flood elevation of 666.4 is approximately 3680 cfs.

c. Elevation (feet above MSL)

(1) Streambed at centerline of dam - 651.0.

(2) Maximum tailwater - unknown.

(3) Upstream invert of outlet works - unknown.

(4) Recreation pool - 661.0.

(5) Full flood control pool - N/A

(6) Spillway crest (permanent spillway) - 661.0.

(7) Design surcharge - unknown.

(8) Top Dam - Low Point - 663.0.

(9) Test Flood Surcharge - 666.4

d. Reservoir (miles)

(1) Length of Maximum Pool - unknown.

(2) Length of Normal Pool - 1.0.

(3) Length of Flood Control Pool - N/A

e. Storage (gross acre-feet)

(1) Recreation Pool - 184.

(2) Flood Control Pool - N/A

(3) Spillway Crest Pool - 184.

(4) Top of Dam - 246.

f. Reservoir Surface (acres)

(1) Recreation Pool - 31.0.

(2) Flood Control Pool - N/A

(3) Spillway Crest - 31.

(4) Test Flood Pool - 31.

(5) Top Dam - 31.

g. Dam

(1) Type - earth and dry masonry.

(2) Length - 230 feet.

(3) Height - 12 feet.

(4) Top Width - 10.0 feet.

(5) Side Slopes - upstream-unknown, downstream-vertical.

(6) Zoning - unknown.

(7) Impervious core - unknown.

(8) Cutoff - unknown.

(9) Grout Curtain - unknown.

(10) Other - unknown.

h. Diversion and Regulating Tunnel

See Section j below.

i. Spillway

(1) Type - concrete slab.

(2) Length of Weir - 18 feet.

(3) Crest Elevation - 661.0.

(4) Gates - none.

(5) Upstream Channel - none.

(6) Downstream Channel - The downstream side of the spillway section has a stone face against which debris such as wood, plywood, logs and a broken up rowboat rests. The channel has a rock bed and many rocks and trees along the banks, however, the main channel is free of debris.

j. Regulating Outlets. The 24 inch diameter outlet pipe is at an approximate invert of 651.0. The discharge is controlled by a butterfly type gate, which is activated by a large wooden lever supported from the downstream face of the dam by steel channels. Maximum discharge of the outlet pipe would be about 40 cfs.

SECTION 2
ENGINEERING DATA

2.1 Design

No original design data were disclosed for Lower Pond Dam. However, a rough plan of the dam was prepared in November 1969 by Dubois and King, Randolph, Vermont as part of a dam inspection report. The present dam was constructed in 1867. The only major modification was refacing of the dam in about 1968.

2.2 Construction

No construction records are available for use in evaluating the dam.

2.3 Operation

No engineering operational data were disclosed.

2.4 Evaluation

a. Availability. There is no design engineering data available for Lower Pond Dam. However, an inspection report by DuBois and King and other inspection reports by the Vermont Department of Water Resources are on file in the Department's offices in Montpelier, Vermont.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint or reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

C. Validity. Since no original plans of this dam are available the information shown in this report are based solely on the results of the visual inspection.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The field inspection of Lower Pond Dam was made on June 21, 1979. The inspection team consisted of personnel from Howard, Needles, Tammen & Bergendoff and Geotechnical Engineers, Inc. A representative of the owner was also present during the inspection. Inspection checklists, completed during the inspection, are included in Appendix A. At the time of inspection, the water level was approximately 2 inches below the crest of the spillway. The upstream face of the dam could only be inspected above this level.

b. Dam. Visual inspection of the dam indicated that it is in fair condition.

The dam, which is about 230 feet long, consists of a dry stone masonry wall about 10 feet thick with a maximum height of 12 feet. An earth fill has been placed against the upstream face of the wall. Approximately 3 feet of the embankment section was above the water line at the time of inspection.

Upstream Slope

The upstream slope of the dam is shown in Photo No. 3. Only the upper few feet could be inspected. There is no riprap slope protection and, in some areas, local sloughing of the slope has occurred. In the area adjacent to the right training wall of the spillway, treaspassing has prevented any vegetation from growing on the slope.

An earlier inspection report, dated October 20, 1978 indicate an erosion cavity in the embankment at the entrance to the spillway structure. This cavity was not observed during this inspection.

Crest

The crest of the dam consists of an embankment section and the dry, masonry wall section. Photos No. 4 & 5 show the embankment section of the crest, which is about 10 feet wide. The top of the dry masonry wall can be seen in Photo No. 9. There is no vegetation growing on the crest between the right abutment and the spillway section. The soil exposed on the crest is a silty, sandy gravel. The surface of the crest is uneven, but no significant movement of the crest was observed.

The right training wall and concrete floor slab of the spillway have been cracked due to settlement of the embankment at the upstream end of the spillway.

Downstream Slope

The downstream face of the dam is formed by a nearly vertical dry masonry wall constructed of large stones. Photos No. 6 & 7 show the masonry wall which has not deteriorated significantly. The masonry section to the left of the spillway is about 8 feet thick and benched as shown in Photo No. 9.

Several small seeps were found at the base of the masonry wall. Photos No. 17 & 18 show a seep located about 52 feet left of the spillway section. Photos No. 15 & 16 show an area of seepage at the base of the wall between the right abutment and the spillway. No flow could be detected at the location of the seeps.

An inspection performed on October 16, 1978 stated that there was a large wet area below the dam between the spillway and the left abutment. It was suspected at that time that the wet area was due to local surficial drainage from the hillside on the left abutment. This large area of standing water was not observed during this inspection.

c. Appurtenant Structures. Visual inspection of the concrete slab spillway, a 24 inch diameter outlet pipe and the spillway/outlet discharge channel did not reveal any evidence of stability problems. Inspection of the appurtenant structures indicated they are in fair condition except for the cracks and spalling of concrete at the spillway structure.

The spillway section consists of a concrete slab and training walls approximately two feet high, as shown in Photos No. 10 & 11. Inspection of the concrete slab and training walls revealed considerable surface deterioration, including cracks and deep spalling. A deep concrete crack through slab and wall is located at the right upstream corner of the spillway, see Photo Nos. 10 & 11. An earlier inspection indicated that a small amount of water was leaking through the downstream masonry face of the dam under the spillway. This leakage was not noted during the inspection.

A 24 inch diameter outlet pipe is located below the left side of the spillway. The control system for the outlet pipe consists of a long wooden lever supported by structural steel post which activates a butterfly valve located inside the pipe. This unusual control system was reported to be operational, see Photos No. 13 and 14.

Visual inspection of the spillway/outlet works discharge channel showed it to be in generally good condition.

c. Reservoir Area. The area around the reservoir is heavily wooded. There are about six homes along the shoreline all set well above the water level. The reservoir banks are clean except for some weed growth near the upstream face of the dam as shown in Photo No. 2.

d. Downstream Channel. The spillway and outlet pipe discharge to the same channel. At the dam this channel is clogged with debris as seen in Photo No. 14, which include wood logs and a broken up rowboat. The channel has a rock bed and many rocks and trees along the banks, however, the main channel is free of debris.

3.2 Evaluation

Visual examination indicates that the dam is in fair condition. Visual examination revealed the following:

(a) Local sloughing along the upstream face of the dam.

(b) Cracking and spalling of the concrete spillway slab.

(c) Several areas of seepage at the base of the downstream slope of the dam.

(d) Dense vegetation immediately downstream of the dam.

(e) Clogging of the outlet channel with debris.

(f) Crest of dam is uneven.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedure

Lower Pond Dam is used to store water for use in cooling at the Iroquois Manufacturing Company. Water is released through the outlet pipe when normal stream flow does not meet the process needs. Based on past inspection reports it is assumed that normally the gate would be closed.

4.2 Maintenance of Dam

There is no regular maintenance procedure in effect. Repairs are made on an as needed basis.

4.3 Maintenance of Operating Facilities

There is no regular maintenance procedure for the operating facilities. Repairs are made as needed.

4.4 Description of Warning Systems

There are no warning systems in effect for this facility.

4.5 Evaluation

The current operation and maintenance procedures for this dam are inadequate to insure that problems encountered can be remedied within a reasonable period of time.

The owner should establish a written operational procedure as well as establishing a warning system to follow in the event of emergency conditions.

SECTION 5
HYDROLOGY AND HYDRAULIC ANALYSIS

5.1 Evaluation of Features

a. General. Lower Pond Dam is a dry stone masonry and earth structure about 230 feet long with a maximum height of 12 feet. An 18 foot crest length concrete slab spillway is located near the center of the dam. The spillway training walls are 2 feet high. Outlet works consists of a 24 inch pipe with a butterfly type valve.

The impoundment is used for the storage of cooling water for a manufacturing process. The dam is classified as small in size having a maximum storage of 246 acre-feet and a height of 12 feet.

b. Design Data. No hydrologic or hydraulic design data were disclosed for Lower Pond Dam.

c. Experience Data. There are no records of maximum discharge at the site. It was reported that at one time the water level reached the top of the dam, which would correspond to a discharge of 160 cfs.

d. Visual Observations. No evidence of damage to any portion of the dam due to overtopping was visible at the time of inspection.

e. Test Flood Analysis. No detailed design and operational information are available for this dam. The hydrologic evaluation was performed using information gathered by field investigation, watershed characteristics, and Probable Maximum Flood (PMF) curves prepared by the Corps of Engineers. In accordance with Corps of Engineer Guidelines the significant hazard classification and small size classification of this dam warrants a test flood magnitude ranging from a 100 year frequency flood to ½ the PMF. A test flood equal to ½ the PMF was used. A test flood inflow of 3900 cfs is based on a watershed of 5.26 square miles in rolling terrain. As 71 percent of the watershed is tributary to Lake Iroquois the test flood was routed through the lake. The discharge from the remaining portion of the watershed was added to the outflow of Lake Iroquois to obtain the test flood inflow for Lower Pond.

The routed test flood outflow was determined in accordance with Corps of Engineers Guidance for Estimating Effect of Surcharge Storage on Maximum Probable Discharge, and the hydraulic characteristics of the dam. The routing was started with the water surface at the crest of the spillway. The routed test flood outflow was determined to be approximately 3680 cfs. As the maximum capacity of the spillway is approximately 160 cfs (about 4 percent of the routed test flood outflow) the dam will be overtopped by 3.4 feet.

A report on Lower Pond Dam prepared by DuBois and King, November 1969, see Appendix B, recommended a design flow of 2800 cfs. This flow may be adequate as a design flow in light of the fact that the test flood inflow can vary of a range of values and the high value was used for this analysis, and that this analysis did not account for any possible desynchronizing of the flow which is tributary to Lake Iroquois.

f. Dam Failure Analysis. The impact of failure of the dam was assessed using the "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs prepared by the Corps of Engineers. The breach discharge was estimated with the water surface at the crest of the dam and a breach width equal to 40 percent of the total length of the dam. The downstream hydrograph is a sum of the breach discharge and the maximum spillway discharge. Prior to the breach of dam the downstream river stage would be about 2 feet with the spillway at a full capacity discharge of 160 cfs. Breach of dam would result in an additional 3630 cfs for a total of 3790 cfs. The downstream stage was estimated using an average channel cross section in the reach between the dam and the center of Mechanicsville 1.0 miles downstream. The flood stage in this reach would be about 7.5 feet. There would be little change in the flood height due to the small volume of channel storage. About 400 feet downstream of the dam there is a dwelling set about four feet above the channel bed. The Iroquois Manufacturing Company is located about 1000 feet downstream of the dam. The working floor of the building is set about 3 feet above the crest of a spillway. The spillway is part of a small mill pond adjacent to the company.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation. The visual inspection of Lower Pond Dam did not reveal any immediate stability problems, but did reveal that there is no upstream slope protection on the embankment. Several areas of seepage were observed at the downstream base of the masonry wall. Dense vegetation at the base of the dam hinders adequate inspection of this important area.

These conditions, if left unattended, could lead to future stability problems.

b. Design and Construction Data. No design or construction data were made available.

c. Operating Records. No operating records were made available.

d. Post-Construction Changes. Correspondence indicates that repairs and modifications were made to the outlet works and spillway in 1968. A letter from Iroquois Manufacturing Company to the Vermont Department of Water Resources dated October 25, 1968, states that the front of the dam has been refaced and that they were attempting to place a clay surface on the water side.

In 1978, an erosion cavity at the entrance to the spillway section was repaired and additional fill added to the upstream section of the dam.

e. Seismic Stability. The dam is located in Seismic Zone 2, and in accordance with the recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7
ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The visual inspection of Lower Pond Dam indicates that the dam is in fair condition. The inspection revealed the following:

(1) The upstream slope is unprotected and local sloughing has occurred.

(2) The lack of slope protection in the immediate vicinity of the spillway intake may have resulted in undermining the structure and caused cracking of the floor slab and training wall.

(3) Several areas of seepage at the base of the downstream slope were observed.

(4) Vegetation immediately downstream of the dam hampers inspection of this important area.

(5) The outlet channel was clogged with debris.

The hydraulic analysis reveals that the spillway cannot pass the routed test flood without overtopping the dam.

b. Adequacy of Information. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency. This dam is in generally fair condition. The recommendations and remedial measures described in Sections 7.2 and 7.3 should be accomplished within one year after receipt of this Phase I Inspection Report by the owner.

d. Necessity of Additional Investigation. No additional investigation is needed to complete the Phase I inspection.

7.2 Recommendations

It is recommended that the owner engage a qualified registered professional engineer to do the following:

(1) Design adequate upstream slope protection.

(2) Investigate the seepage at the base of the dam at a time of high water and after the excessive vegetation has been removed from the base of the dam.

(3) Investigate spillway adequacy and design modifications if necessary.

(4) Consider redesign of the low level outlet control to provide better regulation of flow and make it less susceptible to vandilizm.

7.3 Remedial Measures

(1) Remove vegetation from the base of the dam to a distance 25 feet below the downstream toe.

(2) Remove debris from the spillway area, and discharge channel.

(3) Prepare a downstream warning system in the event of an emergency.

(4) A technical inspection program should be initiated and continued on a yearly basis.

(5) Establish a system such that the reservoir level can be monitored during periods of intense rainfall.

(6) Repair the spalling and cracks of the spillway slab and trainning wall.

(7) Prevent trespassing on the dam.

(8) The crest of the dam should be leveled.

7.4 Alternatives

There are no practical alternatives to the recommendations of Sections 7.2 and 7.3, except that on an interm basis the owner may consider operating the reservoir at a lower level throughout the year.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT LOWER POND DAM

DATE June 21, 1979

TIME 9 AM

WEATHER Fair

W.S. ELEV. 660.8 U.S. _____ DN.S

PARTY:

1.	Gordon Slaney	HNTB	6.		
2.	Stan Mazur	HNTB	7.		
3.	Dan LaGatta	GEI	8.		
4.			9.		
5.			10.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Embankment Dam	D. LaGatta	
2.	Spillway, Outlet Works	S. Mazur, G. Slaney	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER POND DATE 6-21-79

PROJECT FEATURE Embankment Dam NAME D. P. LaGatta

DISCIPLINE Geotechnical Engineer NAME

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	Embankment which has been placed against upstream masonry wall is beneath water levels except for upper 2 ft. The visible material is a silty glacial till.
Current Pool Elevation	660.8
Maximum Impoundment to Date	
Surface Cracks	unknown
Pavement Condition	No pavement.
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	No misalignment observed.
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	Erosion of embankment at spillway.
Indications of Movement of Structural Items on Slopes	Cracks in spillway wall & floor.
Trespassing on Slopes	There is a walking path road to spillway from right abutment.
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None observed
Unusual Embankment or Downstream Seepage	Small seeps at several locations along base of wall
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None
Vegetation	Excessive

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER POND DAM DATE June 21, 1979

PROJECT FEATURE Intake Channel/Structure NAME D. LaGatta

DISCIPLINE Structural/Hydraulic/Geotechnical NAME S. Mazur, G. Slaney

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	None
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	None
Debris	None, (at upstream side of dam)
Condition of Concrete Lining	
Drains or Weep Holes	None
b. Intake Structure	
Condition of Concrete	Fair
Stop Logs and Slots	None

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER POND DAM DATE June 21, 1979

PROJECT FEATURE Control Tower NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	This facility has no tower.
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER POND DAM DATE June 21, 1979

PROJECT FEATURE Transition & Conduit NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	None
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER POND DAM DATE June 21, 1979

PROJECT FEATURE Outlet Structure/Channel NAME D. LaGatta

DISCIPLINE NAME S. Mazur, G. Slaney

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	A 24 inch diameter steel outlet pipe is located below the left side of the spillway. The control system for the outlet pipe consists of a wooden lever and structural steel post which activates a butterfly valve located inside the pipe. This unusual control system appears to be operational.
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain Holes	None
Channel	Clear
Loose Rock or Trees Overhanging Channel	None
Condition of Discharge Channel	Good

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER LAKE DAM DATE June 21, 1979

PROJECT FEATURE Spillway/Channel NAME D. LaGatta

DISCIPLINE Structural/Geotechnical/Hydraulic NAME S. Mazur, G. Slaney

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	None
General Condition	
Loose Rock Overhanding Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Concrete	Fair condition; cracks and spalling were noted on spillway's slab and walls.
Rust or Staining	None
Spalling	Spillway's training walls
Any Visible Reinforcing	None
Any Seepage or Efflorescence	None
Drain Holes	None
c. Discharge Channel	
General CHANNEL Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None of significance
Floor of Channel	Good condition-Natural stream
Other Obstructions	None

PERIODIC INSPECTION CHECK LIST

PROJECT LOWER POND DAM DATE June 21, 1979

PROJECT FEATURE NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	This facility has no service bridge.
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

ENGINEERING DATA

1. LIST OF DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS - NONE AVAILABLE

2. PAST INSPECTION REPORTS

3. PLAN AND DETAILS

PAST INSPECTION REPORTS

LOWER POND DAM

VT 00059

CONNECTICUT RIVER BASIN
HINESBURG, VERMONT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

REPORT ON TWO DAMS IN HINESBURG, VERMONT

The only dams of any size in the town of Hinesburg are two dams impounding storage. Both are located on the same stream (a tributary of the LaPlatte River) and serve to regulate the stream flow for miscellaneous purposes of small developments below. One is the Lake Iroquois dam and the other, located about a mile downstream, is the Lower Reservoir dam. They are operated and maintained by a combine of the small power development owners, known as Water Power Operators and located along the course of the stream.

Both of these dams were inspected by the writer. An account of the condition of each follows.

Lake Iroquois Dam

Lake Iroquois, sometimes called Hinesburg Pond, is a natural lake raised in level by a dam at its outlet. At full pond it has a surface area of about 25¼ acres. About 61,000,000 cu. ft. of its volume are impounded by the dam. The drainage area is about 4 sq. mi.

The dam is essentially of dry stone masonry, its cross-section being indicated in Fig. 1. It is about 100 ft. in total length and 7 ft. in maximum depth. A thin concrete cap completes the crest of the dam.

At the maximum section is a regulated, low level, rectangular outlet with a concrete-lined intake. The foundation for the dam is in general, earth with large boulders.

As inspected by the writer, the dam has lost some of the stones in its downstream facing but stability is not as yet affected. The concrete portion appears in good condition and the upstream earth blanket is retarding leakage.

The whole dam serves as a spillway at times of high water. It could stand some overflow but abutment conditions are not suited for this type of discharge. Scour and wash out at the ends at flood time, could cause, at least, a partial failure of the dam.

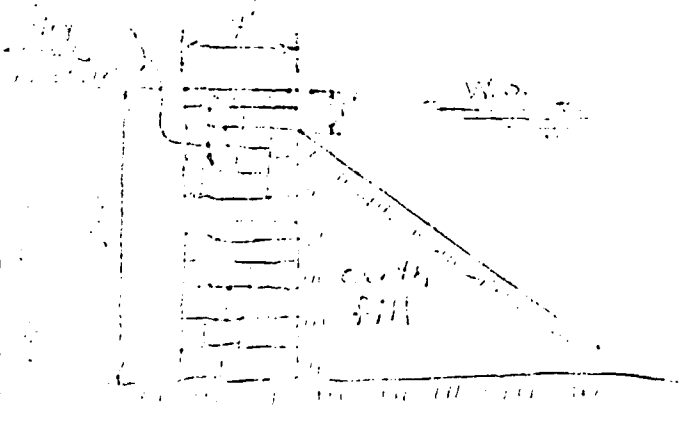


Fig. 1 - Typical section, Lake Iroquois Dam

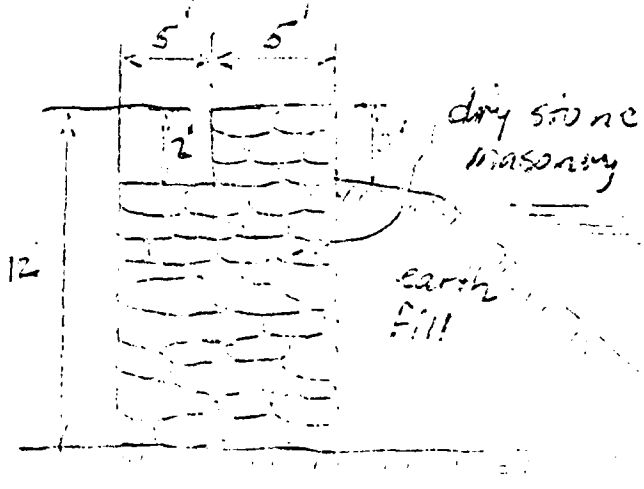


Fig. 2 - Typical Section, Lower Reservoir Dam

Lower Reservoir Dam

This dam creates a pond having a surface area of about 30 acres and a volume of about 5,300,000 cu. ft. The drainage area is 6 sq. mi.

This dam is also of dry stone masonry with an upstream blanket of earth fill. Its typical section is indicated in Fig. 2. The masonry section is about 250 ft. long, 10 ft. thick, and 12 ft. deep. In the center is a crudely formed overflow notch 14 ft. long and 1 ft. deep. Here the downstream face is indented to make the masonry section about 5 ft. thick. This section also contains a regulated outlet at its base, consisting of a 2 ft. dia. steel conduit controlled by a valve. The structure is on an earth foundation.

The dam has weathered well and its general condition is satisfactory. Stability is enhanced by the large boulders used in its make-up. The dam is of ample section except at the spillway. (greatest depth) At this point, the indication is that some movement has taken place, but has not entirely weakened the section.

For full pond conditions, the limited discharge capacity makes overtopping possible. Leakage through the dam with the higher pond levels provides for a more rapid drawdown.

Conclusions

These two dams may be considered in acceptable condition in view of somewhat favorable channel conditions downstream should failure occur.

STEPHEN H. HAYBROOK
HYDRAULIC ENGINEER

Report No. 203

May 1, 1951

TMENT OF WATER RESOURCES
MONTPELIER, VERMONT

OFFICE MEMORANDUM

ROUTING		
GENERAL		
TO	NOTED	DATE
DEC	[illegible]	10/23
PLOT	[illegible]	10-25
D.C.	[illegible]	10/23
RETURNED TO		
FILE	✓	

O: Commissioner Thieme

R M: John E. Cerutti

UBJECT: Sunset Lake - Hinesburg

ATE: October 23, 1968

On October 22, 1968, I visited Sunset Lake and the dam at the outlet. The water level appears to be four to six feet below normal. The lake is pretty well emptied and there is much mud flats showing. Water is flowing through the outlet pipe. There appears to be about as much water flowing out of the dam as is flowing into the lake. I also visited Lake Iroquois. The water level is 20 inches below normal.

There appears to have been some repair work done on the outlet and gate at Sunset Lake dam. The masonry has been moved around over the outlet pipe and a bulldozer has moved some of the earth on the upstream face of the dam. There appears to be no good spillway section at present.

INSPECTION REPORT

ON

LOWER POND DAM

AT

HINESBURG, VERMONT

PREPARED FOR

Department of Water Resources

State of Vermont

June, 1970

DuBOIS & KING

Engineers • Planners

RANDOLPH, VERMONT

LOWER POND DAM

Lower Pond Dam

Vermont has experienced a history of major floods during which loss of life occurred and extensive property damage resulted. Structure failure of existing dams and the inadequacy of their spillways and outlet structures has contributed significantly to resulting peak flood flows and associated flood losses. These failures resulted from inadequate hydraulic capacity to pass flood waters, improper and inadequate structural design and stability of the dams, and inadequate or improper maintenance or repair of existing structures.

The Vermont Water Resources Board is charged with the authority to investigate certain dams under the jurisdiction of the Board, under the authority granted by Title 10, Vermont Statutes Annotated, Section 708 and 714. These investigations are primarily to assure the public that the dams are in a safe state of upkeep and repair and are also adequate to pass flows of water, which may be reasonably expected.

The Department of Water Resources has retained the consulting engineering firm of DuBois & King to make inspections and investigations to evaluate the adequacy of the structures.

A visual examination of the Lower Pond Dam was made on June 22, 1970. Topographic surveys of the structure and surrounding area were made on November 5, 1969. The general features of the structure are indicated on Exhibits 1 and 2 in the back of this report. Photographs were taken on June 22, 1970, and are also in the back of this report.

Purpose

The purpose of this inspection report is to:

1. Summarize the findings as a result of our investigation of the Lower Pond Dam in the Town of Hinesburg, Chittenden County, Vermont.

2. Report on the present state of the structure, its upkeep and repair.

3. Evaluate the adequacy of the spillways and outlets to pass the flows of water which may be reasonably expected.

4. Recommend to the Board appropriate action to be taken in view of any reasonable flood hazard associated with the existing dam.

5. Recommend to the Board any necessary repairs or alterations.

Scope

The scope of this investigation includes:

a. Visual field inspections of the structure and surrounding site to ascertain the physical characteristics and conditions of the dam.

b. Field surveys and measurements to determine dimensions of the structure.

c. Studies to determine the adequacy of the spillways and outlets to pass flood flows which might be reasonably anticipated.

d. Summarizing the investigations, surveys, and photographs into this report.

Watershed Description

Upstream of the Lower Pond Dam the watershed has an approximate area of 5.4 square miles. Lake Iroquois is located less than one-half mile upstream of the upper reaches of the Lower Pond.

The watershed itself is elongated in the north-south direction and is surrounded by Mount Pritchard on the west and Texas Hill on the east. Above Lake Iroquois the northern reaches of the watershed are quite flat.

Lake Iroquois, having an approximate water surface of 254 acres and the Lower Pond having an approximate surface of 31 acres, totals some 285 acres of water surface in the watershed.

A location plan is shown as Exhibit 3 in the back of this report.

Lower Pond is fed primarily from the Lake Iroquois watershed. There are no large brooks or streams draining into Lake Iroquois or Lower Pond and the watershed is composed of small peripheral streams draining to the two lakes.

Site Description

The dam at the outlet of Lower Pond is located approximately 1.8 miles above the junction of Patrick Brook and the LaPlatte River which flows to Shelburne Bay in Lake Champlain. Lower Pond and Lake Iroquois are the headwaters of the Patrick Brook.

At the present water elevation the pond created by the dam is long and narrow in the north-south direction and has a normal water surface elevation of 661 U. S. G. S. datum. Use of the pond appears to be limited to recreational purposes.

There are no buildings located immediately below the dam but the Iroquois Manufacturing Company is located approximately 0.2 of a mile below the dam on Mechanicsville Road. The watercourse below the dam follows a relatively steep and deep ravine just south of the Mechanicsville area and flatens out on the low lands in the vicinity of Hinesburg Village.

Structure Description

Four photographs taken on June 22, 1970, are included in the back of this report and show the general conditions and state of the structure on that date. Plans indicating the general details of the structure and surrounding area are included as Exhibit 1 and Exhibit 2 in the back of this report.

The Lower Pond Dam is unconventional in design and consists of earth embankment on the upstream side with two levels of stone walls on the downstream side, as indicated in Exhibit 1 and Exhibit 2. These stones on the downstream side, being in two levels, seem to indicate the possibility that the dam was originally at the lower level and it was decided to raise the height of the dam whereby the second stone wall was placed with additional earth embankment upstream of it. The central section of the dam contains a concrete spillway approximately 18 feet wide which provides for normal discharge over the top of the dam as indicated in Photograph No. 2.

The stones in the lower level wall appear to be more carefully placed than the upper level. However, both levels are loose and contain large voids. The stones in the upper level appear to be somewhat in a random placement.

The embankment on the easterly side of the center spillway section is inadequate in section permitting water to pass over the earth embankment and through the stone walls adjacent to the easterly wall of the spillway as shown in Photograph Nos. 2 and 3.

Leakage is occurring at the base of the lower level stone wall for the entire length of the dam. A 24-inch pipe is located below the concrete spillway at the base of the dam and extends into the pond. There are means of controlling the flow out of this pipe to maintain flow in the brook below. Details of this control method are not known.

The actual interior construction of the dam beneath the exposed work is not known as only visual observations were made during the inspection of this structure.

Structural Condition

The following observations are based solely on visual examination of the structure without benefit of detailed plans and design data.

1. The concrete in the spillway section appears to be sound and in good condition. See photograph No. 2.

2. The earth embankment just east of the concrete spillway is inadequate in section and permits water to pass through the embankment which is slowly eroding away in the vicinity of the spillway.

3. The stone walls are very loosely placed and exist with relatively large voids between them.

Adequacy of the Spillway

On June 22, 1970, at the time of the inspection of the structure, the water surface in the pond was right at the crest of the spillway section with less than one-quarter inch going over the spillway. A considerable amount of flow was passing through the 24-inch pipe to maintain flow in the brook below.

As evidenced by aquatic growth lines along the concrete spillway, the water had been recently 3 or 4 inches higher. the lake level appeared to be at a seasonal normal based on observations along the immediate shoreline.

The capacity of the concrete spillway section is approximately 170 cubic feet per second with the flow through the sections at a 20 inch depth which is the maximum possible without over topping the dam. Over topping the dam by approximately one foot of surcharge over its 200-foot length would increase the total capacity of the structure to pass a flow of approximately 700 cubic feet per second. Such a discharge would erode the earth embankment of the top of the dam and would very possibly result in displacement of the stone walls on the downstream side of the dam.

There being approximately a total water surface of 285 acres in the watershed, 254 acres in Lake Iroquois and 31 acres in the Lower Pond, such available pondage should be considered in establishing any reasonable flood flow that might occur and be expected to pass through or over the Lower Pond Dam. Detailed studies of the available pondage have not been made. However, if the water surface were to rise in both bodies of water by approximately one foot, this would represent one inch of runoff from the drainage area of 5.4 square miles. This amount of pondage would be insignificant in reducing any flood flows that could be expected by a long period of precipitation and resulting large quantities of runoff from the drainage area.

It is estimated that a reasonable rate of runoff at the Lower Pond Dam would be of the magnitude of 520 cubic feet per second per square mile which would result in an anticipated flood discharge of 2,800 CFS. Therefore, it is concluded from the limited capacity of the section in the section in the center of the dam and the necessity to over top the dam that the capacity of the spillway and the dam is highly inadequate to pass a flood flow which could be reasonably expected or would be used for the design of a realistic spillway discharge.

Recommendations

Based on the visual examination of the structure it is recommended that:

1. Immediately the earth embankment should be reinforced by placing additional impervious material and stones along the top of the dam just east of the concrete spillway thus making the dam watertight in this area.

2. The voids between the stones in the dam be filled with impervious material or concrete so as to make the structure more watertight and structurally stable.

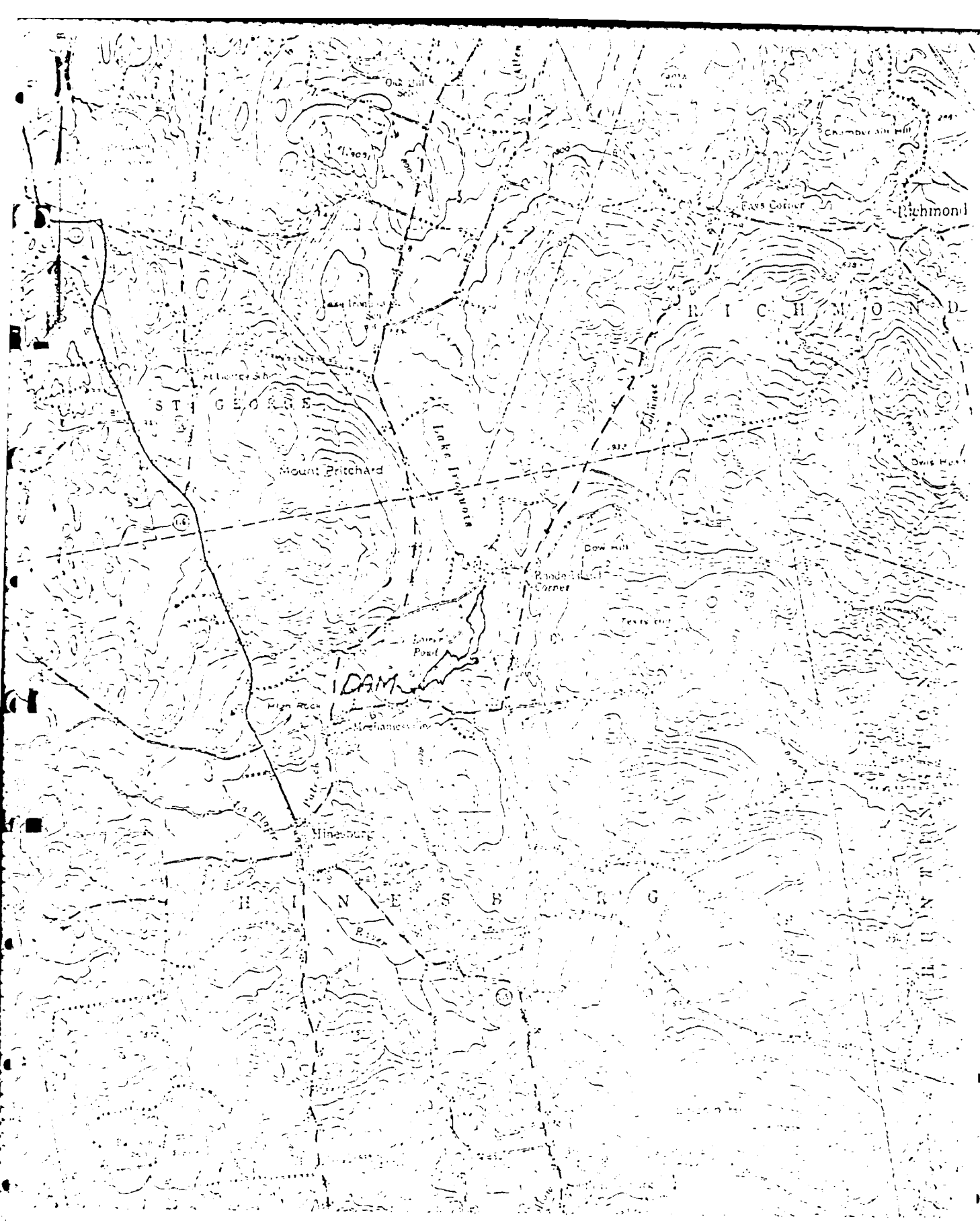
3. In lieu of the above items the dam be completely reconstructed to provide a spillway capable of passing 2,800 CFS either through the spillway or top of the structure without seriously flooding the Lower Pond area.

4. The brush and trees be cleared downstream of the dam and the seepage beneath the dam be checked and examined more closely to indicate its magnitude and severity on the stability of the structure.

Respectfully submitted,

DUBOIS & KING

Richard E. DuBois, P. E.



DUBOIS & KING
ENGINEERS-PLANNERS

SCALE 1" = 5,280'

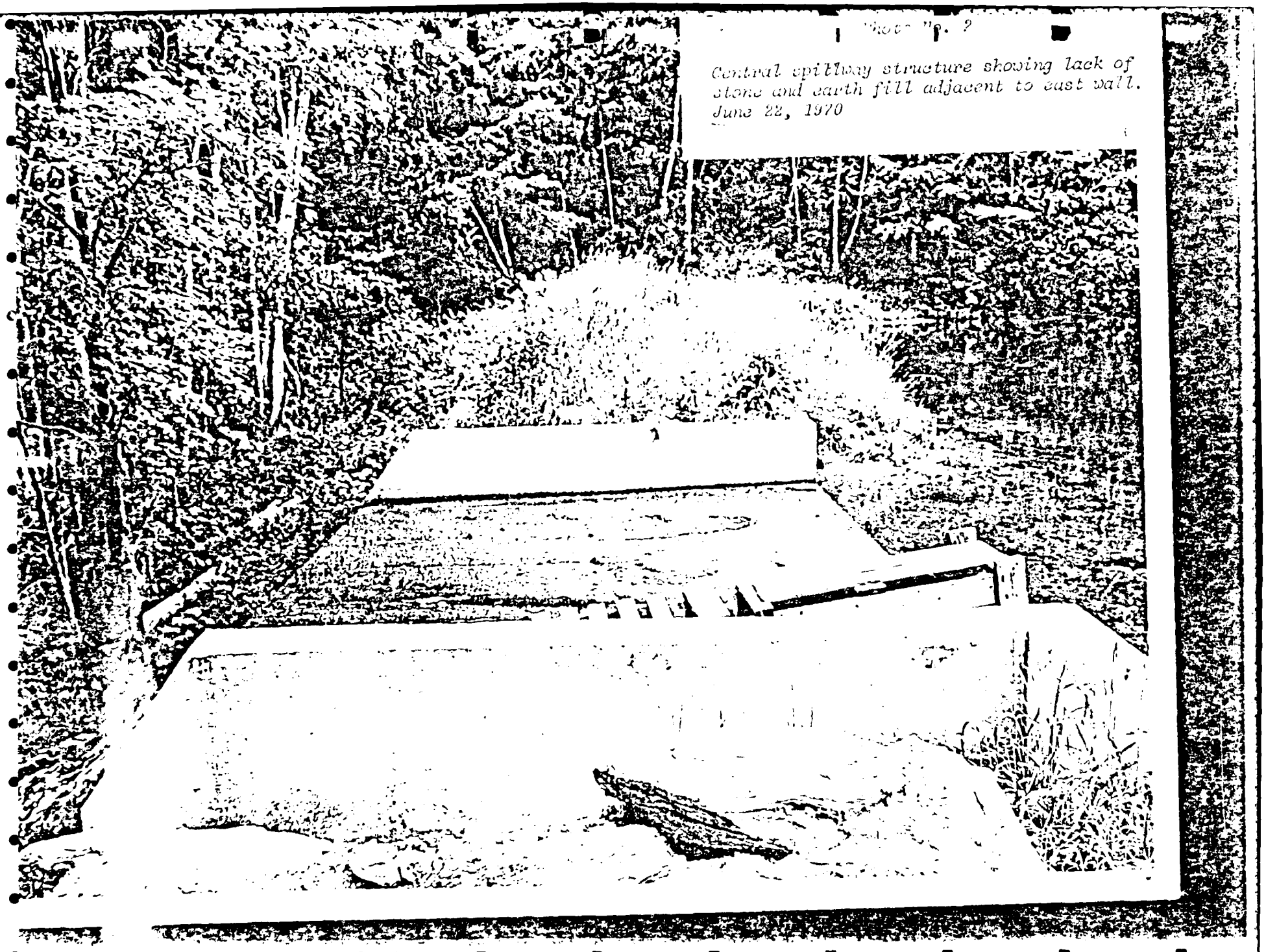
LOCATION PLAN
LOWER MILL POND

LOWER POND DAM

Photo No. 1

Upstream of dam as viewed from west bank showing top of earth embankment and central spillway section. June 22, 1970

Photo No. 2

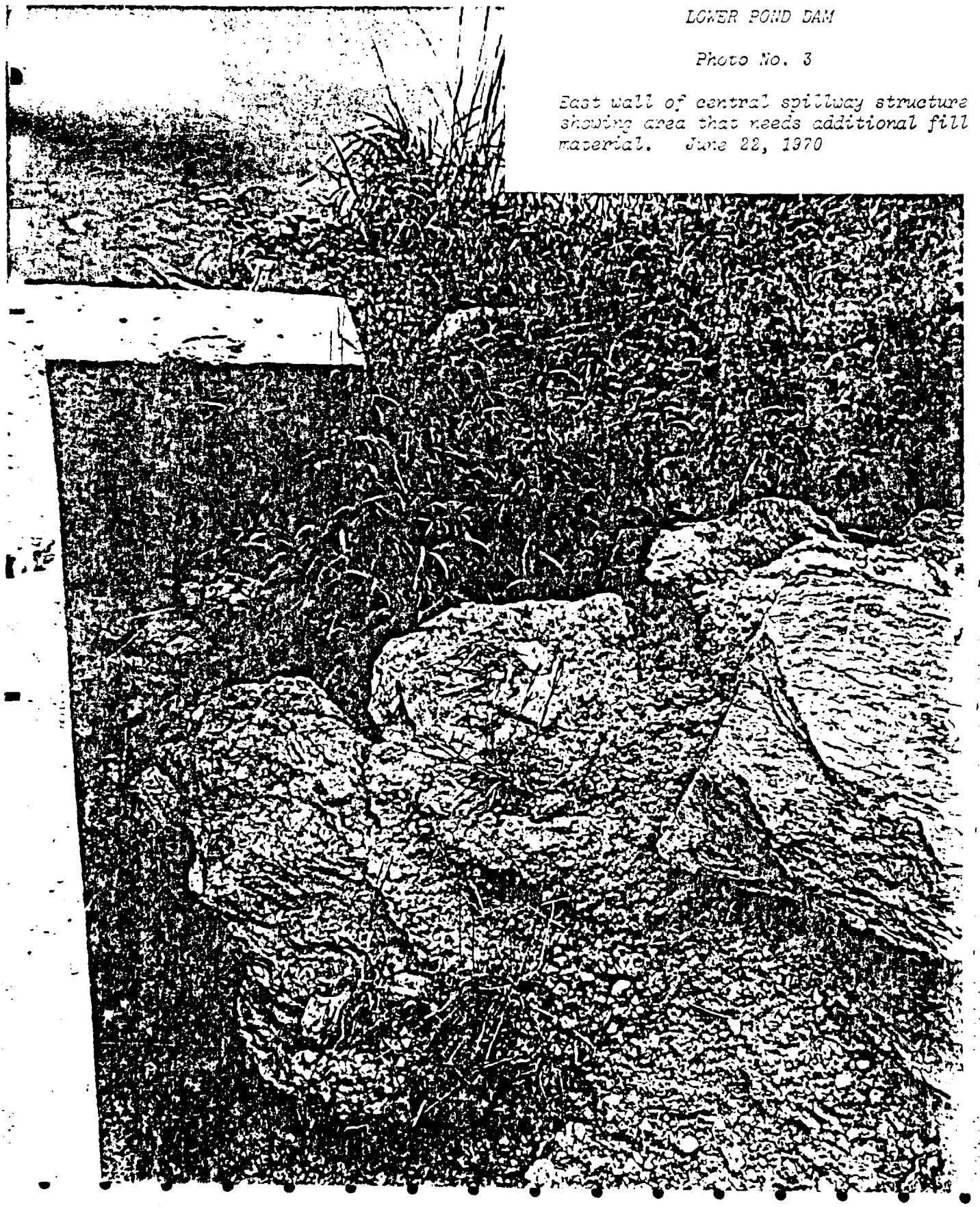


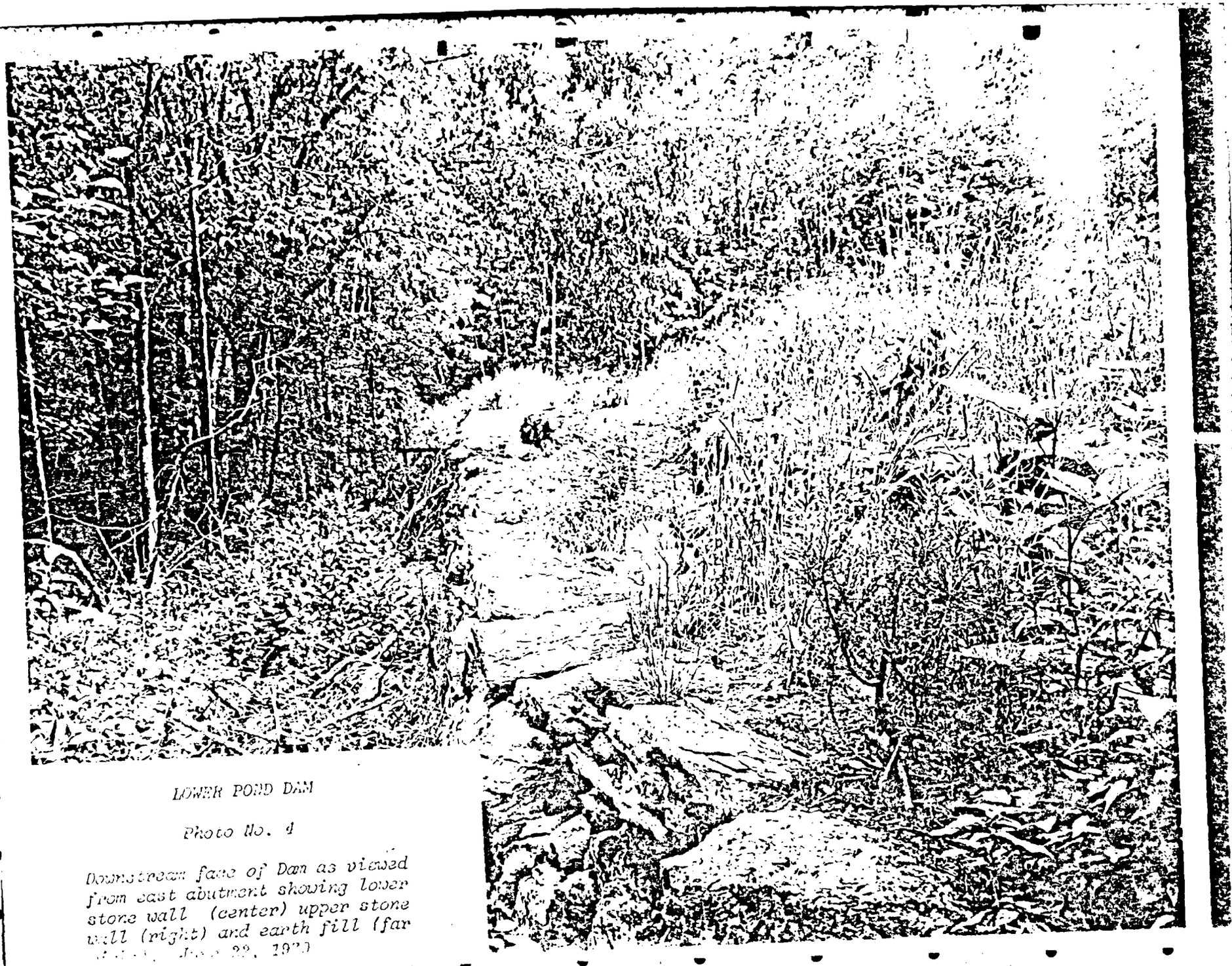
Central spillway structure showing lack of stone and earth fill adjacent to east wall. June 22, 1970

LOWER POND DAM

Photo No. 3

East wall of central spillway structure showing area that needs additional fill material. June 22, 1970





LOWER POND DAM

Photo No. 4

Downstream face of Dam as viewed from east abutment showing lower stone wall (center) upper stone wall (right) and earth fill (far [illegible] June 22, 197[illegible]

Lower Pond (Lake Sunset)
Town of Hinesburg

Martin L. Johnson, Commissioner

John E. Cerutti

January 6, 1972

The aforementioned body of water is approximately 31 acres in surface area. The water of the pond is impounded by a dam owned and operated by the Iroquois Manufacturing Company of Hinesburg. This company owns all the water rights and has the right to use the water as they so desire.

In regards to the aquatic weeds, we spoke with Jim Morse and he acknowledged that Lower Pond is a shallow pond with a muddy bottom. He did investigate this problem before, and his answer as before, is that to treat the weeds with chemicals would be an endless operation.

We recommend that individual camp owners meet with the owner of the dam and possibly work out an agreement. In this situation, it is not the Department's responsibility to become involved.

ROUTING

GENERAL

TO	NOTED	DATE
[illegible]	[illegible]	
[illegible]	[illegible]	

SUSPEND TO

FILE

DJM ASR 8/2
1/8/76

To, File
From: Don Spies DJS
Re: Lower Pond Dam - Hinesburg

On July 23, 1975, the writer made a visual inspection of the subject structure. The site is unchanged from when DuBois & King made their inspection in 1970. It was noted there is leakage out the drain pipe, but not of a significant quantity.

The dam is a Class II structure.

File
Dam Safety 6115

re (Sunset Lake) Dam - Leesburg

The writer inspected the subject structure on September 8, 1997. The dam is basically unchanged from previous inspections. However, there appears to be seepage under the spillway. At the time of the inspection the water level was below the spillway crest and it was not possible to determine the amount of the seepage.

All the recommendations contained in the DuBois & King report still apply.

STATE OF VERMONT

AGENCY OF ENVIRONMENTAL CONSERVATION

Montpelier, Vermont 05602
Department of Water Resources

WATER QUALITY DIVISION

October 19, 1978

E
Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources
Environmental Board
Division of Environmental Engineering
Division of Environmental Protection
Natural Resources Conservation Council

ROUTING

TO	NOTED	DATE

SIGNATURE

FILE

M E M O R A N D U M

To: File

From: A. Peter Barranco, Jr., Dam Inspection Engineer

Subject: Lower Pond Dam and Mill Pond Dam - Hinesburg

On October 16 the writer inspected subject structures. (Lower Pond Dam) It was found to be in essentially the same condition as when inspected by DuBois & King in September 1969 and by the Department of Water Resources in August 1975, and September 1977.

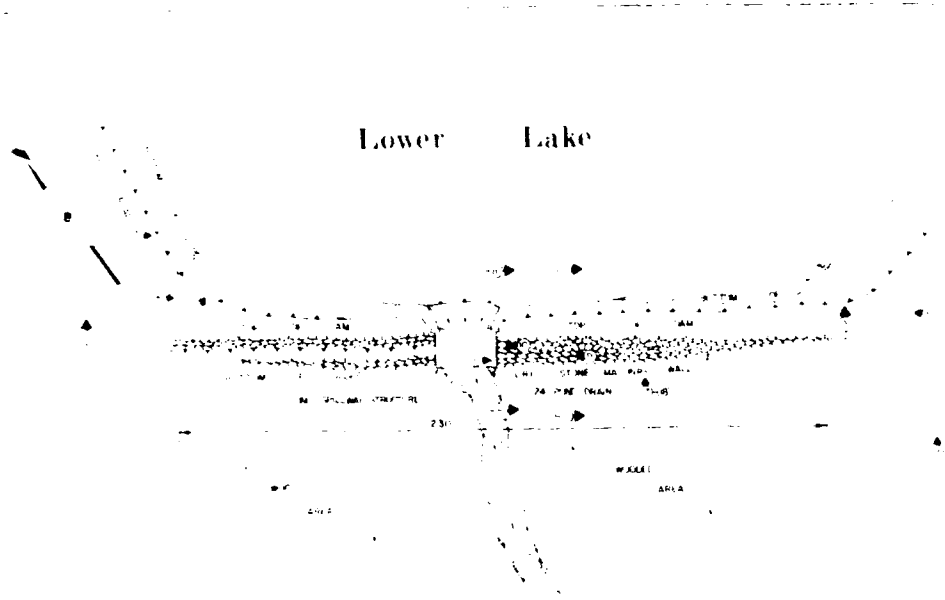
The water level was 4.5' below the spillway crest and all flows were being passed by the drain. (According to Mr. Mark Lyman of Iroquois Mfg. Co., the pond has been drawn down to make repairs - i.e. plug cavity under spillway and stop leaks around spillway and along top of dam).

The area downstream of the dam on the left side extending to the hillside was wet; also, a perched pool about 12' left of spillway and about 10' downstream of face of dam was noted. This pool was about 0.5' above tailwater pool. The wet areas may be due partially to local drainage. The perched pool was probably from the dam. There was no visible leakage through the downstream wall, however, the pond was down.

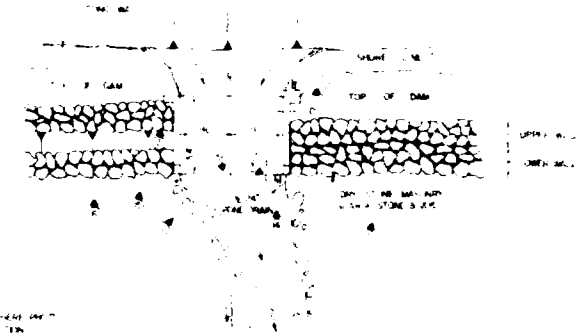
The downstream wall has a slight batter and appears stable. There was no noticeable displacement of the wall downstream. Brush and small trees are growing on the crest and should be cut. Photos and additional dimensions were taken and are attached.

The writer also inspected the Mill Pond Dam adjacent to the Iroquois Mfg. Co. building. This pond was used to divert water to the water wheel in the building. The penstock has been removed but according to Mr. Lyman the water wheel was used up to 1963 for mechanical power.

vl

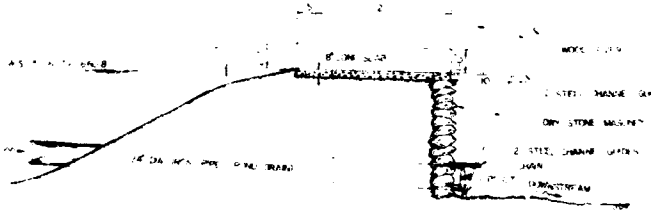


OVERVIEW PLAN

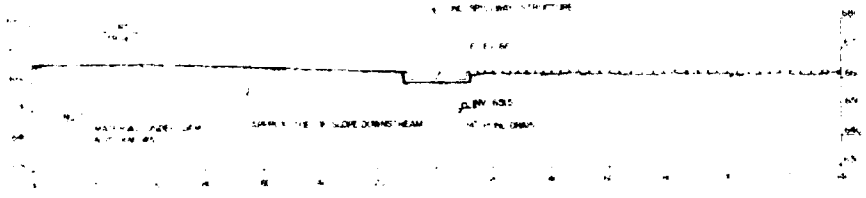


LEGEND

PLAN OF SPILLWAY

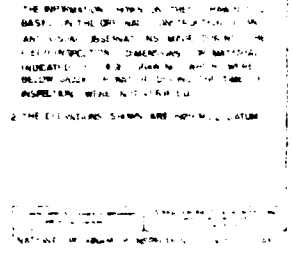


SECTION B-B



SECTION A-A

SECTION C-C



APPENDIX C

PHOTOGRAPHS

FOR LOCATION OF PHOTOS, SEE FIGURE 1
LOCATED IN APPENDIX B

PHOTO NO. 1 - View of reservoir.

PHOTO NO. 2 - Weed growth immediately upstream of the dam.

PHOTO NO. 3 - Upstream face of dam.

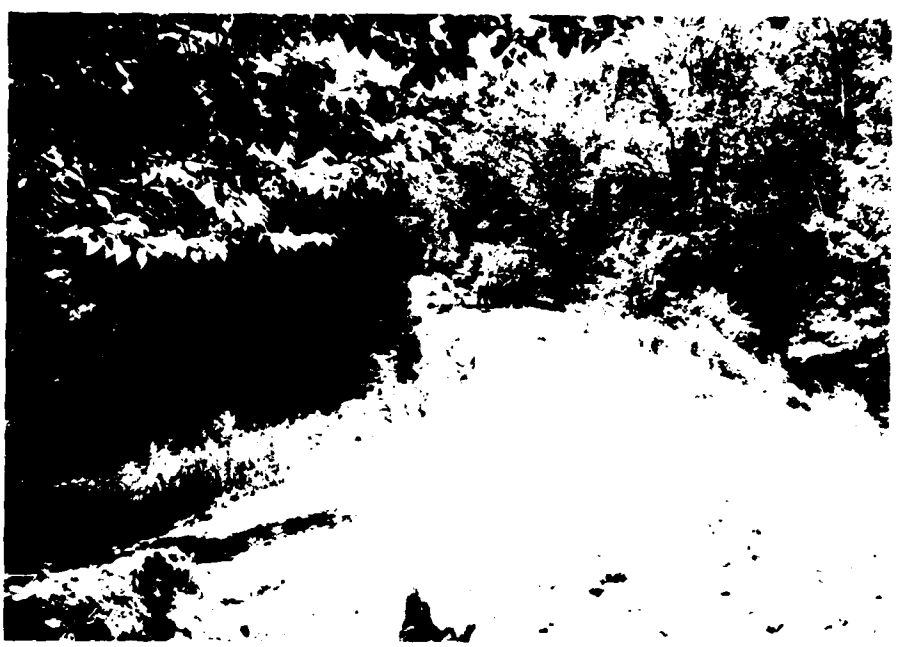


PHOTO NO. 4 - Crest of dam as seen from right abutment.

PHOTO NO. 5 - Crest of dam as seen from left abutment.

PHOTO NO. 6 - Downstream face of dam to the right of the spillway.

PHOTO NO. 7 - Downstream face of the dam to the left of the spillway.

PHOTO NO. 8 - Downstream edge of the dam crest to the left of the spillway.

PHOTO NO. 9 - Dam crest and spillway.

PHOTO NO. 10 - View of spillway section.

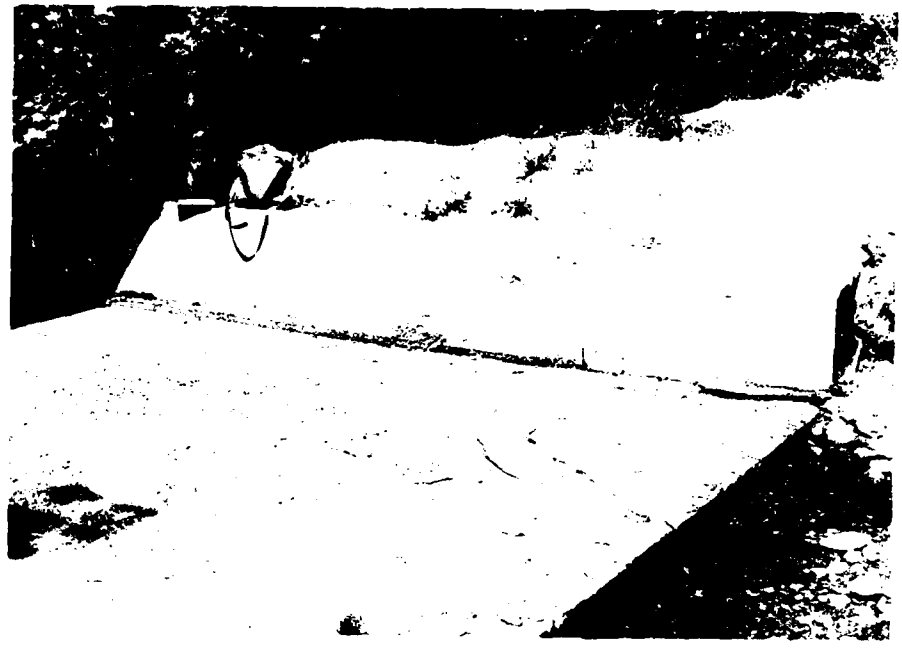


PHOTO NO. 11 - Detail view of spillway section.

PHOTO NO. 12 - View [illegible] point.

PHOTO NO. 13 - Operating mechanism for outlet pipe gate.

PHOTO NO. 14 - Outlet pipe discharge and operating mechanism. Note plywood debris.

PHOTO NO. 15 - Small seep at base of masonry wall between spillway and right abutment.

PHOTO NO. 16 - Another seep located near the same location as that in Photo No. 15

PHOTO NO. 17 - Area of small seep located at base of downstream masonry wall about 52 feet left of the spillway.

PHOTO NO. 18 - Close-up of seep shown in the photo above.

PHOTO NO. 19 - Channel just downstream of the dam.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

HNTB
HOWARD NEEDLES TAMMEN & BERGENDOFF

Made by	RV	Date	3/29/79	Job No	5505-11-09
Checked by		Date		Sheet No	1

For Lower Pond Dam

Hydraulics & Hydrology

Lower Pond Dam: is located across Patrick Brook in the Town of Hinesburg, Chittenden Co., Vermont in the Richelieu River Basin.

Classification: Size: Small
Hazard: Significant

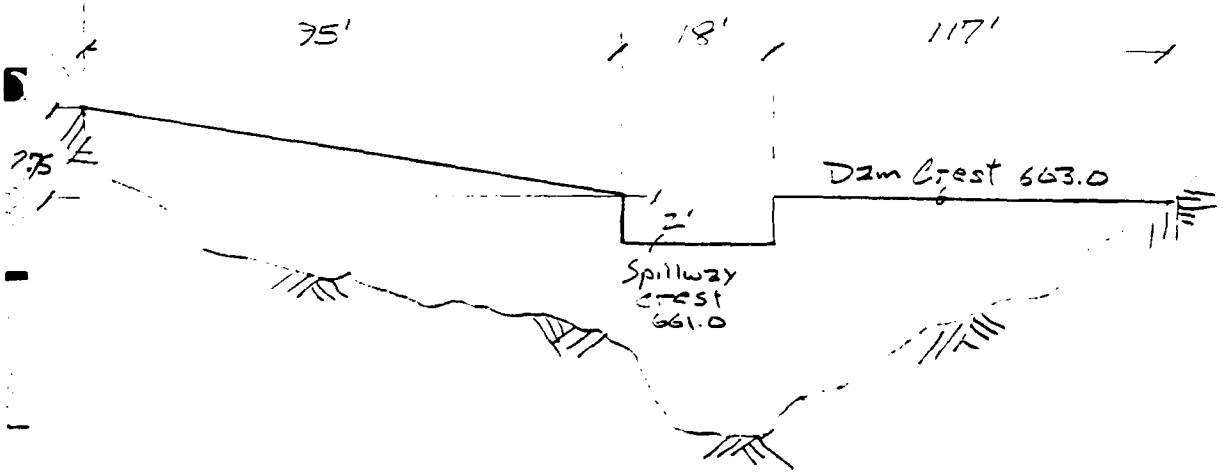
Basic Data: DA: 5.26 mi² Total
3.72 mi² controlled by Lake Iroquois
1.54 mi² directly to Lower Pond
Upstream Basin - Rolling.

Reservoir - Normal Pool elev. 661.0
Storage 134 acre ft
At Low Point of
Top of dam elev. 663.0
Storage 246 acre ft

Dam - Earth & dry masonry
Length - 230 ft
Height - 12 ft max.

Spillway - weir
Length 16'
Crest 661.0

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 6/29/79	Job No 5965-11-09
	Checked by	Date	Sheet No 2
For Lower Pond			



Section of Dam Thru Axis

Step 1 Calculation of Test Flood Inflow

Classification – Size : Small
Hazard : Significant

Hydrologic Evaluation Guideline recommends

100yr Frequency Flood to 1/2 PMF for Inflow

1/2 PMF as hazard posed by dam is on higher range of hazard range.

Use Rolling Curve – No major stream tributary to pond and upstream storage controls 70% of basin.

For TFI to Lower Pond, route flow tributary to Lake Iroquois over Lake Iroquois Dam, and add uncontrolled runnoff directly tributary to Lower Pond.

Runoff Tributary to Lake Iroquois 3.72 Sq mi
Runoff directly tributary to Lower Pond 1.54 Sq mi

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 6/29/79	Job No 5965-11-09
	Checked by [illegible]	Date 7/20/79	Sheet No 3
For Lower Pond			

Inflow to Lake Iroquois 3600 cfs
Routed outflow 1950 cfs
see pages 6&7 for calculation

Direct inflow to Lower Pond

1/2 × 2500 csm × 1.54 sq mi = 1925 cfs

Total TFI at Lower Pond 1950 cfs
1925 cfs
3875 say 3900 cfs.

Test Flood Inflow inflow = 3900 cfs

Step 2 Calculation of Surcharge

Consider: no discharge through 24" discharge pipe.

Spillway-discharge
Broad crest weir $Q = CLH^{3/2}$
Crest elev. 661.0
Length 18.0'
C = 3.09.

$Q = 55.6 H^{3/2}$

Discharge-over dam crest Left-side horizontal crest
Broad crest weir
Crest elev. 663.0
Length 117'
C = 3.00

$Q = 351 H^{3/2}$

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 5/29/79	Job No 5965-11-09
	Checked by	Date	Sheet No 4
For Lower Pond			

Right side of Dam Crest Sloped Crest

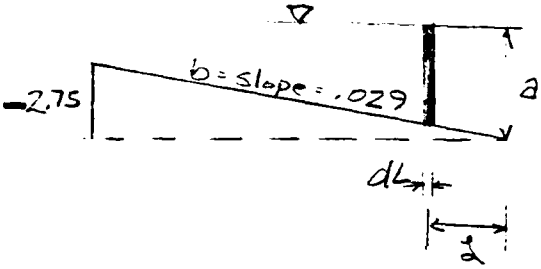
Broad Crest weir $C = 3.00$

Length 95'

Crest elev 663.0 Low point

665.75 high point

$Q = CL(H-Z)^{3/2}$ H varied



$dQ = C\,dL\,(a - bL)^{1.5}$

$$\Sigma dQ = C \int_{L=0}^{L=L} (a - bL)^{1.5}\, dL$$

$$Q = C\left[\frac{(a-bL)^{2.5}}{-2.5b}\right]_0^L = C\left[-\frac{(a-bL)^{2.5}}{2.5b} + \frac{a^{2.5}}{2.5b}\right]$$

$$= C\left(\frac{a^{2.5} - (a-bL)^{2.5}}{2.5b}\right)$$

Stage - Discharge

Elev	H	a	$Q_{Spillway}$	Q_{Left}	Q_{Right}	Q_{Total}
662	1	0	56 cfs			56 cfs
663	2	0	157			157
664	3	1	289	351 cfs	41 cfs	681
665	4	2	445	993	234	1672
666	5	3	622	1824	644	3090
666.7	5.7	3.7	757	2498	1053	4308

HNTB	Made by RV	Date 6/29/79	Job No 5965-11 27
HOWARD NEEDLES TAMMEN & BERGENDOFF	Checked by —M	Date [illegible]	Sheet No 5
For Lower Pond			

Step 3 Calculation of Surcharge Effect

$Q_{P_1} = 3900$ cfs

Storage = vertical prism above elev 661.
Lake surface 31 acres

$Q_{P_2} = Q_{P_1} \times \left(1 - \frac{Stor}{9.5}\right)$

RO. = 9.5 in a result of 19" PMR

$$Stor\,(in) = \frac{Stage\,ft \times 31\,acre \times 12\,in/ft}{640\,acre/mi^2 \times 5.72\,mi^2} = 0.10 \times Stage$$

Routing Curve

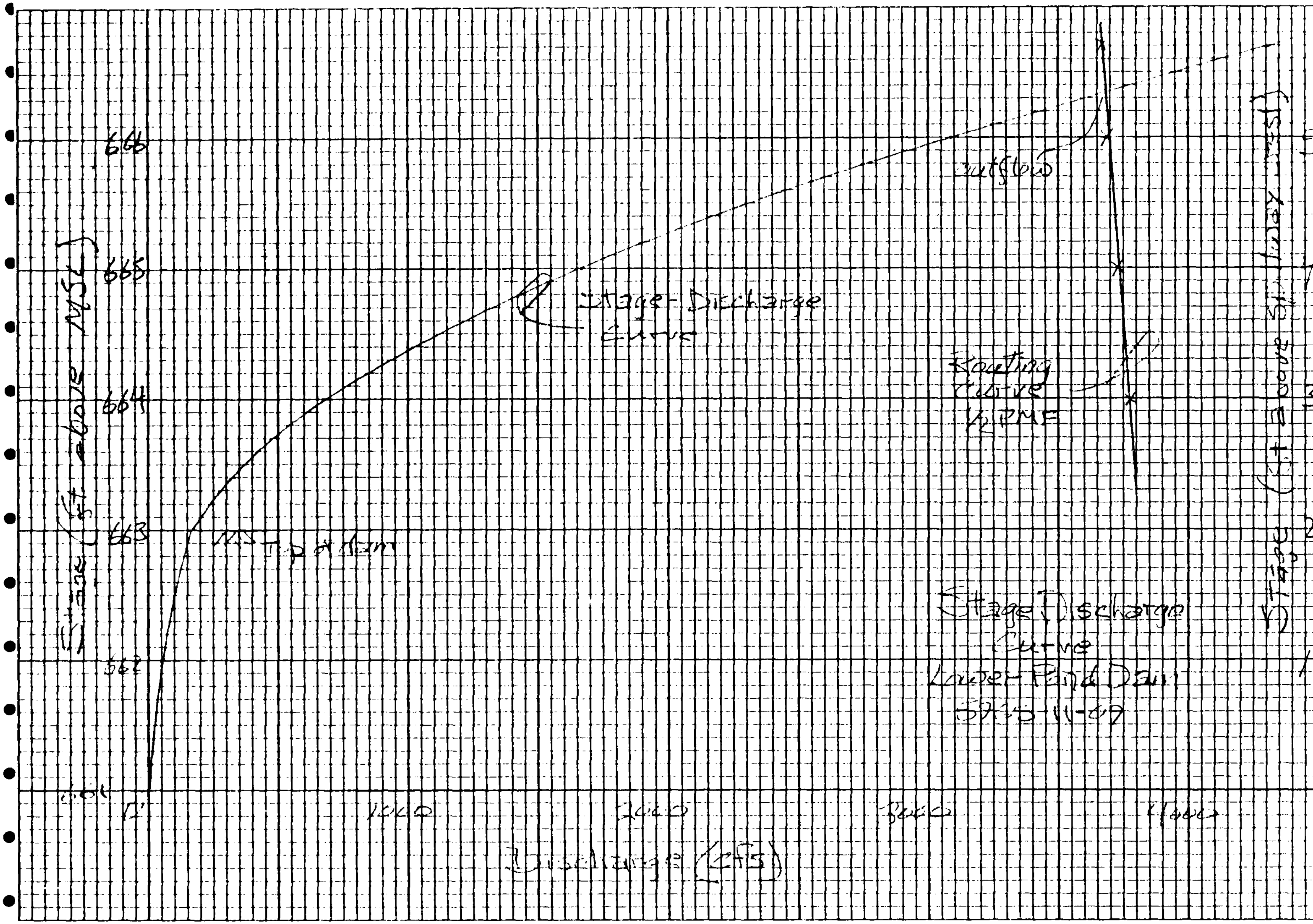
See figure 1 for Plot

Elev	Stage	Stor (in)	Q_{P_2}
664	3 ft	.3	3780 cfs
665	4	.41	3730
666	5	.51	3690
666.7	5.7	.58	3660

See Figure 1 for: Outflow 3680 cfs

Stage 666.35 ft MSL

3.35 ft above crest of dam.



Stage (ft above MSL)
666
665
664
663
662
Top of Dam
Stage-Discharge Curve
Routing Curve 1/2 PMF
Outflow
Stage Discharge Curve
Lower Pond Dam
11-09
1000
2000
3000
4000
Discharge (cfs)
Stage (ft above Spillway crest)
5
4
3
2
1

HNTB
HOWARD NEEDLES TAMMEN & BERGENDOFF

Made by	Date	Job No
KDY	6/27/79	5305-11-09
Checked by	Date	Sheet No
		6

For Lower Pond - Test Flood Calculation

Stage - Discharge Iroquois Dam

Stage Dam Crest	① L=88' b=.0256 a	Q	② L=10.5' b=0 a	Q	③ L=29' b=.017 a	Q	Total
0			-0.5 ft = 12 cfs				12 cfs
.5	.5 ft	8 cfs	1.0	32	.5 ft	13 cfs	53
1.0	1.0	48	1.5	60	1.0	60	168
1.5	1.5	133	2.0	92	1.5	128	353
2.0	2.0	273	2.5	128	2.0	211	612
3.0	3.0	729	3.5	212	3.0	415	1356
4.0	4.0	1349	4.5	310	4.0	660	2319
6.0	6.0	2943	6.5	538	6.0	1253	4734
7.0	7.0	3885	7.5	666	7.0	1594	6145

1/2 PMF Rolling Curve

Q_{P_1} = 930 CSM × 3.72 × 1/2 ≅ 3600 cfs

Storage = Stage × 230 acres

$$\text{Stor (inches)} = \frac{\text{Stage} \times 230 \text{ acres} \times 12 \text{ in/ft}}{3.72 \text{ mi}^2 \times 640 \text{ acre/mi}^2} = 1.16 \times \text{Stage}$$

Routing - Curve

$$Q_2 = Q_{P_1} \times \left(1 - \frac{\text{Stage}}{7.5}\right)$$

Stage	Storage (in)	Q_{P_1}
2	2.32	2720 cfs
3	3.48	2280
4	4.64	1840

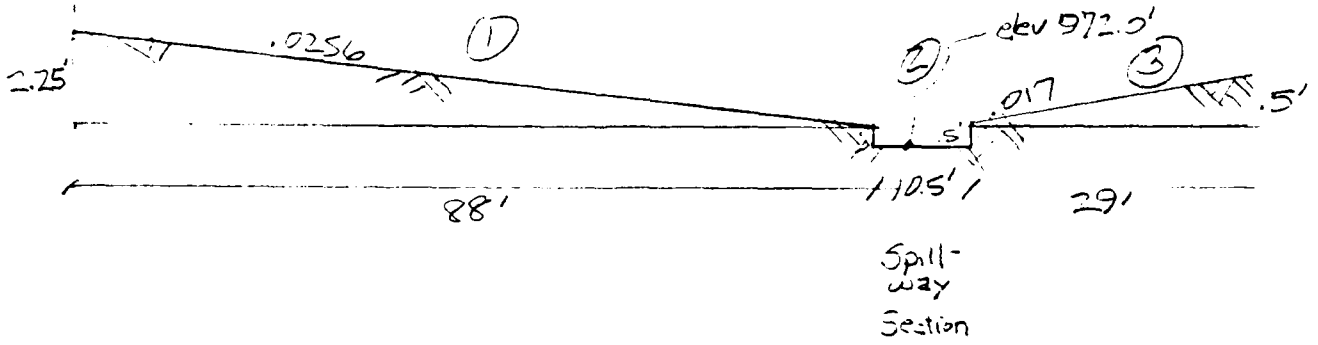
Outflow 1950 cfs

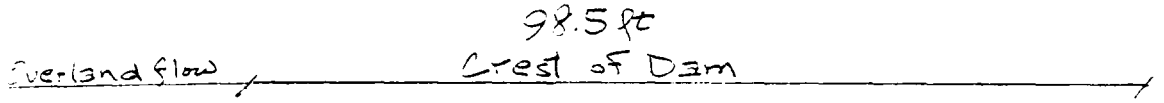
See Fig 2

HNTB	Made by RY	Date 6/27/07	Job No 5955-11-07
HOWARD NEEDLES TAMMEN & BERGENDOFF	Checked by	Date	Sheet No 7

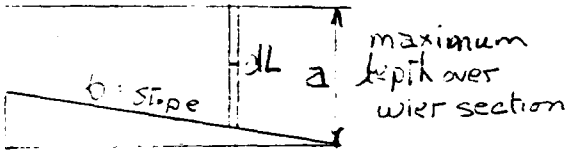
For Lower Pond - Test Flood Calculation

Stage - Discharge - Chaquaw Dam





Broad-crest weir $Q = CLH^{3/2}$ $C = 3.09$

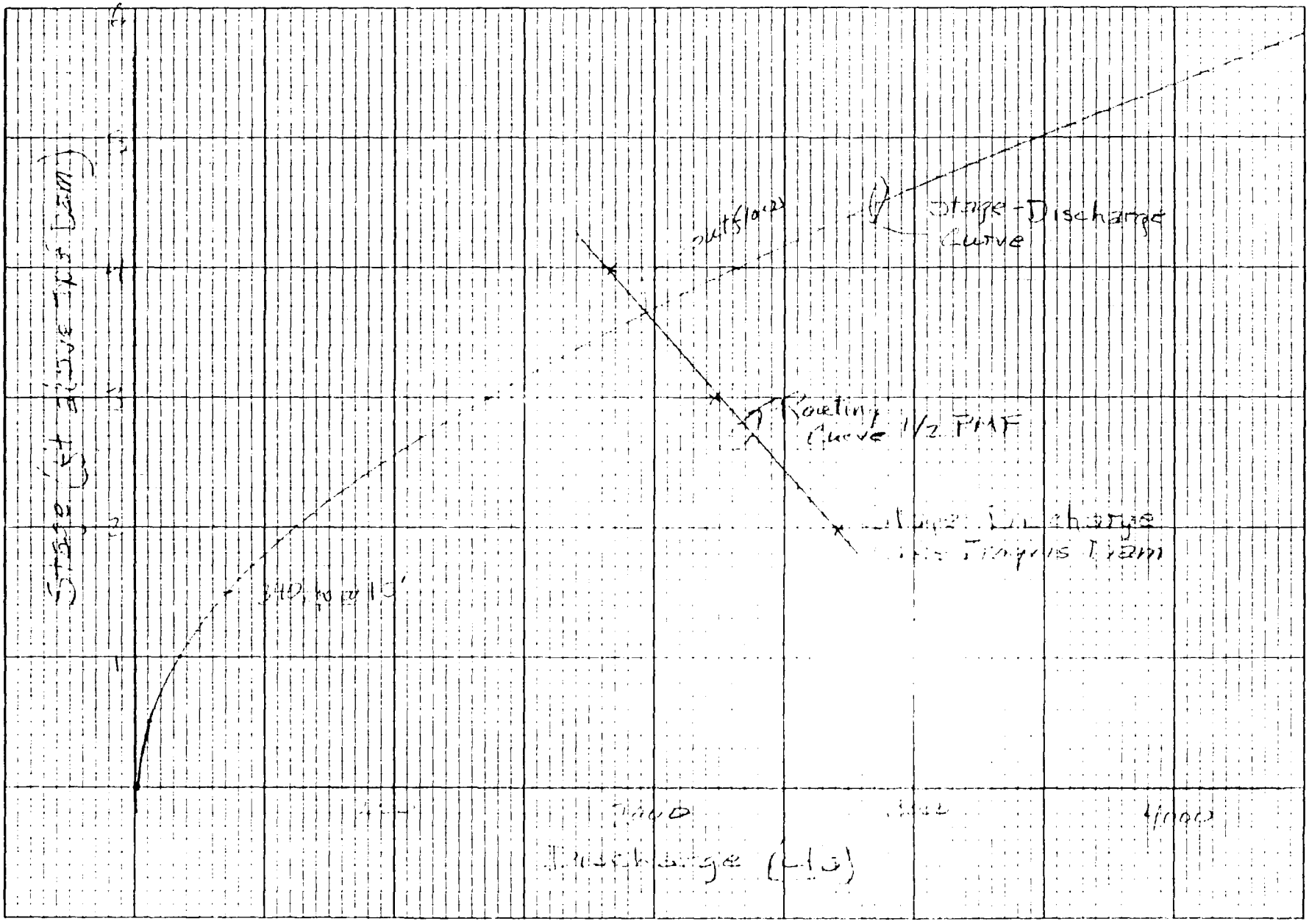


$$dQ = C\,dL(a - bL)^{1.5}$$

$$\sum dQ = C\int_{L=0}^{L=L}(a - bL)^{1.5}\,dL$$

$$Q = \int_0^L C\left(\frac{(a-bL)^{2.5}}{-2.5b}\right) = C\left[\frac{(a-bL)^{2.5}}{2.5b} + \frac{(a)^{2.5}}{2.5b}\right]$$

$$Q = \left(\frac{a^{2.5} - (a-bL)^{2.5}}{2.5b}\right)C$$



HNTB	Made By RV	Date 6/12/79	Job No 59-5-11-9
HOWARD NEEDLES TAMMEN & BERGENDOFF	Checked By	Date	Sheet No 8
For Lower Pond			

Downstream Damage Assessment

Step 1 Reservoir Storage

At top of Dam (low point) elev. 663.0
Reservoir Area 31 acres
Storage 246 acre-ft.

Step 2 Breach Outflow

$$Q_{P_{Breach}} = 8/27 \sqrt{g}\, W_o\, Y_o^{3/2}$$

W_o = 40% of dam width at mid height = .4 x 130'

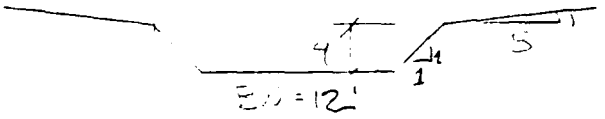
Y_o = Max height red to max pool 12 ft

$$Q_{P_{Breach}} = 8/27 (\sqrt{32})(.4)(130)(12)^{3/2} = 3630 \text{ cfs}$$

$Q_{Spillway}$ 160

3790 cfs

Step 3 Stage - Discharge



Reach Length = 5000'
S Channel = .05 x %
n_{ch} = .05
n_{ob} = .10

Stage - Discharge

4	980 cfs
5	1560
6	2300
7	3240
8	4495

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 6/28/79	Job No 5965-11-09
	Checked by	Date	Sheet No 9
For Lower Pond			

Step 4 Breach Outflow

$Q_{P_1} = 3790\ cfs$ $\quad S = 246$ ac-ft

$Stage_1 = 7.5$ ft $\quad area_1 = 195$ ft²

$$V_1 = \frac{195 \times 5000}{43560} = 22.4 \text{ ac-ft}$$

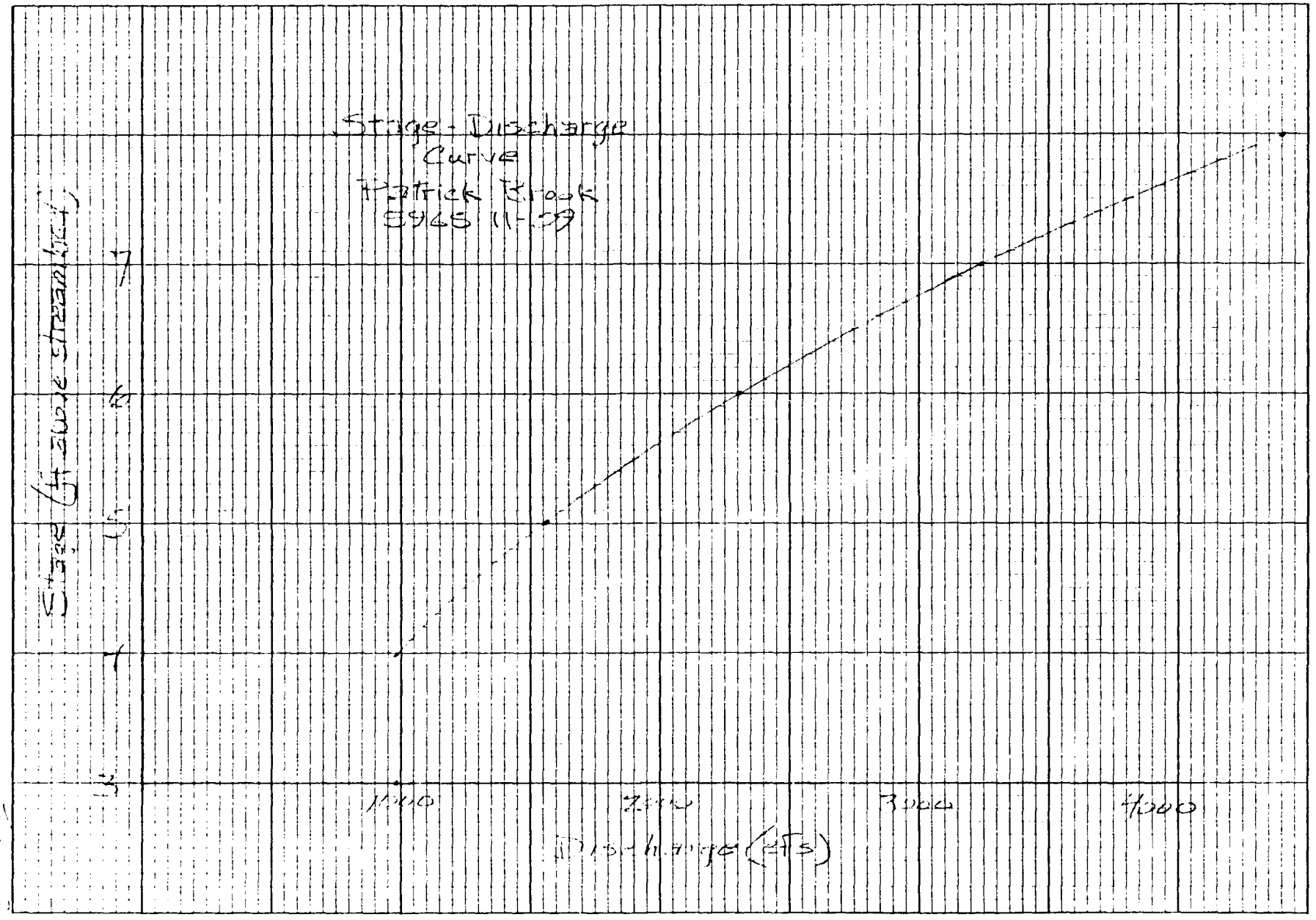
$$Q_{P_{2T}} = 3790\left(1 - \frac{22.4}{246}\right) = 3440\ cfs$$

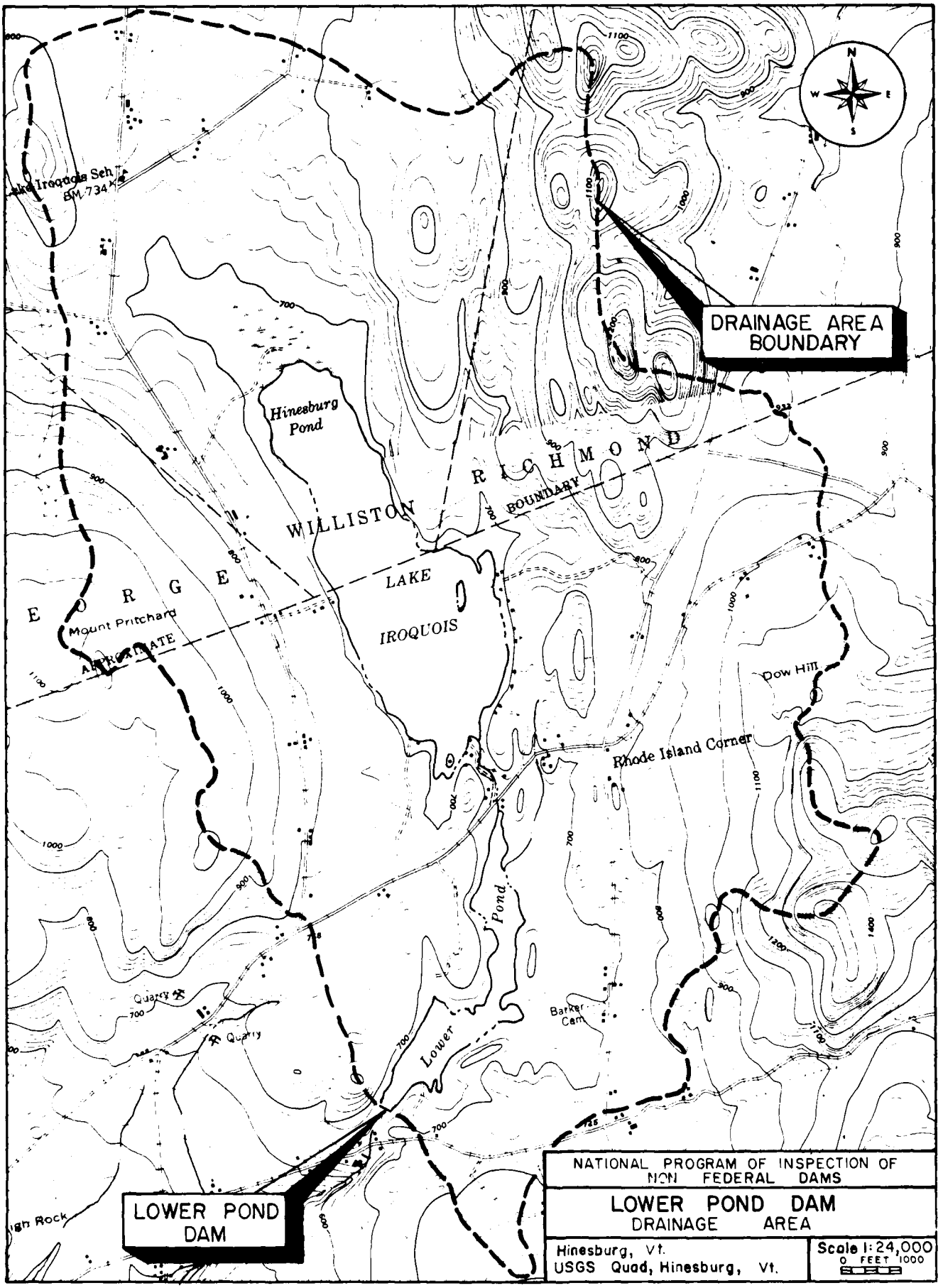
$Stage_2 = 7.2$

No significant reduction in floodwave due to channel storage.

~100' d.s. one dwelling 4 ft above channel

~2mi d.s. Iroquois Manufacturing Co. 3-5 ft above stream



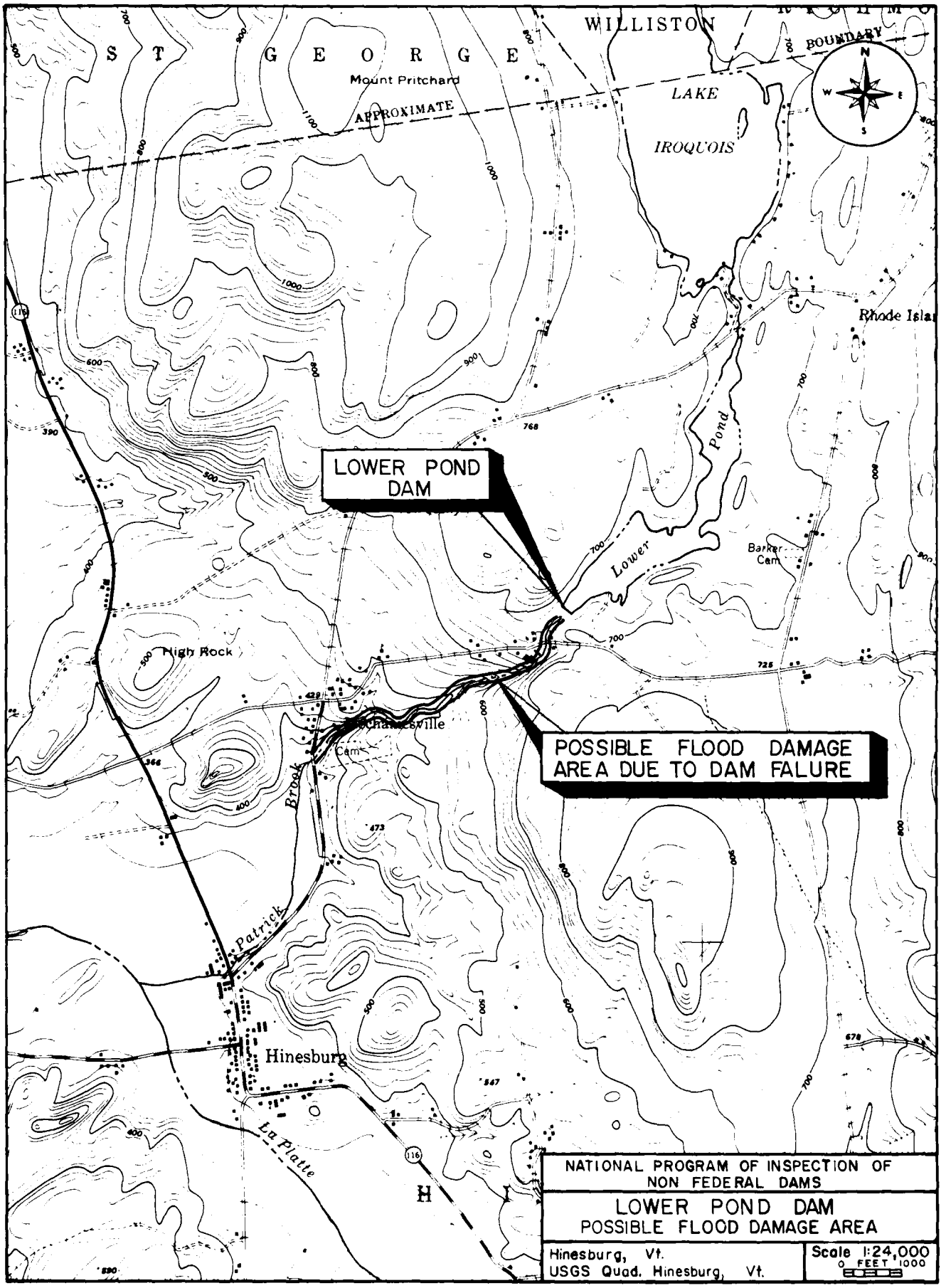


NATIONAL PROGRAM OF INSPECTION OF NON FEDERAL DAMS

LOWER POND DAM
DRAINAGE AREA

Hinesburg, Vt.
USGS Quad, Hinesburg, Vt.

Scale 1:24,000
0 FEET 1000


WILLISTON
S T G E O R G E
Mount Pritchard
APPROXIMATE
LAKE
IROQUOIS
BOUNDARY
N
W
E
S
Rhode Isla
LOWER POND DAM
Pond
Lower
Barker Cem
High Rock
Charlotteville
Cem
POSSIBLE FLOOD DAMAGE AREA DUE TO DAM FALURE
Brook
Patrick
Hinesburg
La Platte
116
NATIONAL PROGRAM OF INSPECTION OF NON FEDERAL DAMS
LOWER POND DAM
POSSIBLE FLOOD DAMAGE AREA
Hinesburg, Vt.
USGS Quad. Hinesburg, Vt.
Scale 1:24,000
0 FEET 1000

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS

STATE	STATE NUMBER	DIVISION	STATE	COUNTY	CONGR DIST	STATE	COUNTY	CONGR DIST	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
VT	59	NED	VT	007	01				LOWER POND DAM	4425.9	7305.5	27	JUL	79

POPULAR NAME	NAME OF IMPOUNDMENT
	LOWER POND

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI)	POPULATION
02	01	PATRICK BROOK	MECHANICSVILLE	0	50

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT)	HYDRAULIC HEIGHT (FT)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
REGTPG	1867	8	12	12	246	184	NED	N	N	N	N	

REMARKS

21-STONE MASONRY 23-INDUSTRIAL

D/S HAZ	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH
2	230	U	18	160	510											

OWNER	ENGINEERING BY	CONSTRUCTION BY
IROQUOIS MANUFACTURING		

REGULATORY AGENCY

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
HOWARD NEEDLES TAMMEN BERGENDOFF	21	JUN	79	PUBLIC LAW 92-367 AUG 1972

REMARKS

END

FILMED

8-85

DTIC